grinding and finishing

The Shape of Wheels to Come

Cutting A Star

Control Reduces Tool Grinding Costs
— part 2

A Study of Electrically-Aided Grinding

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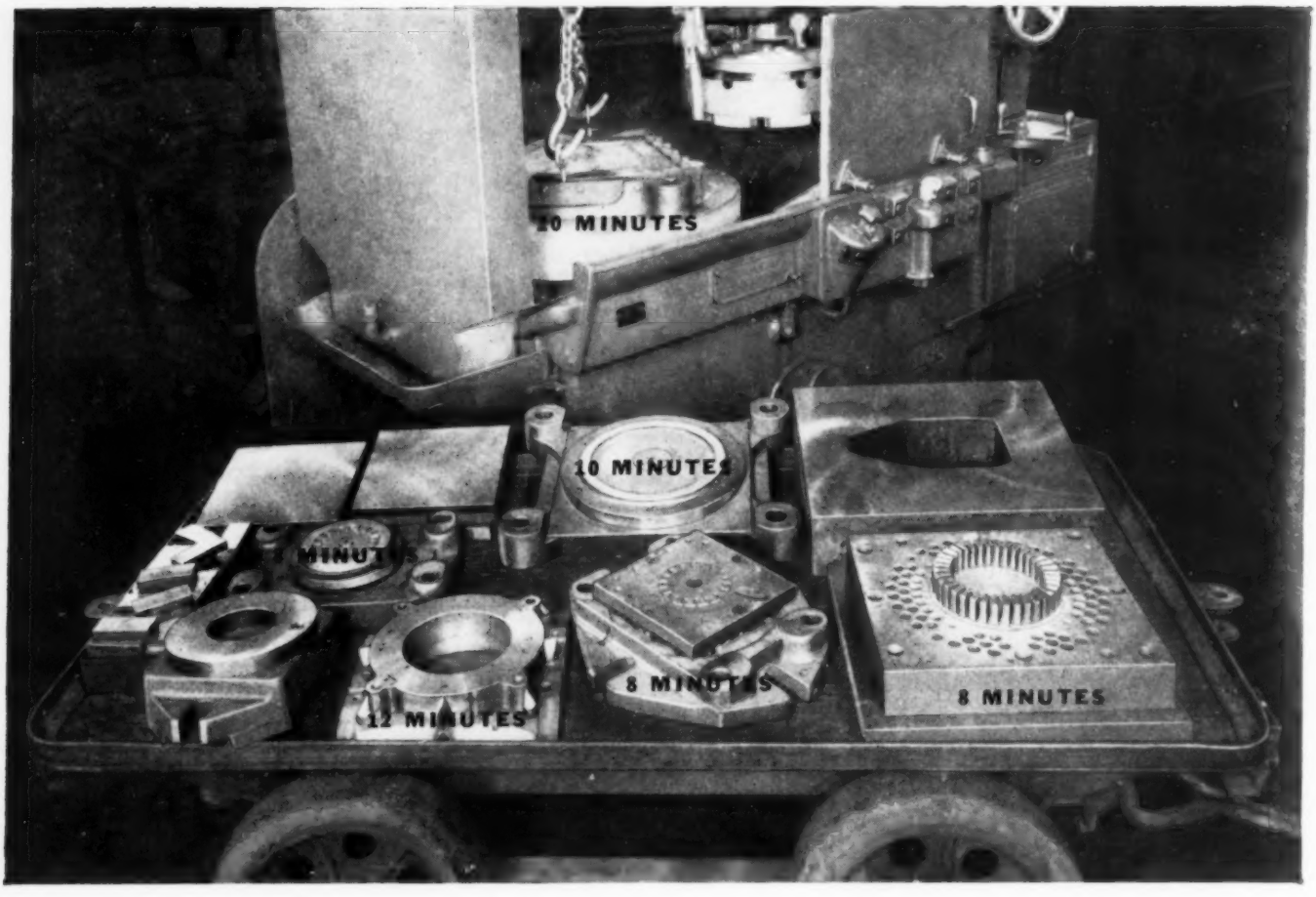


The *EASIEST, FASTEST and CHEAPEST WAY* TO SHARPEN A DIE is to... *PUT IT ON A BLANCHARD!*

The Blanchard method of die sharpening is unequalled for speed, safety and economy. All of the dies shown are sharpened on a Blanchard No. 18 Surface Grinder with equal ease.

The rotary work motion of the Blanchard, with the wheel covering the entire surface at each revolution, enables the operator to remove the amount of stock to sharpen the die and no more! This saves time and increases the life of the die, too.

The ample supply of coolant and the ability to use free-cutting wheels permit high grinding speeds without danger of burning the work. This extra speed reduces idle time on the presses.

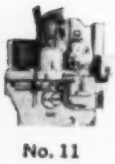
Many shops use their Blanchards for die sharpening as well as all other surface grinding required in their manufacturing. The 3 Blanchards shown below cover work requirements from finishing tiny gears to roughing steel plates 84" across corners.

Write today for your free copy of WORK DONE ON THE BLANCHARD, Fifth Edition and "the Art of Grinding", Fourth Edition.

BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 State Street, Cambridge, Massachusetts, U. S. A.



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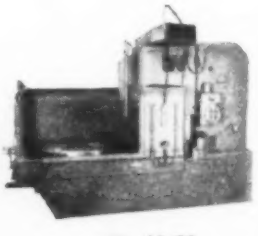
No. 18



No. 42-72

. . . Wherever abrasive operations are performed

grinding and finishing

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BPA

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Now—FINISH FLAT

New Norton 6" x 18" Surface Grinder Ready For Immediate Delivery

You FINISH FLAT FASTER with the new Type S-3 hydraulic which is equally efficient for long production runs or a wide variety of toolroom grinding because of its new cost-cutting features. It produces plane surfaces smoothly — with automatic or manual cross feed and with such fast, cool-running action that it saves time and money on every job.

Ask your Norton Representative for the whole story. Or write us direct for Catalog 2128. And remember: only Norton Company offers you such long experience in both grinding machines and grinding wheels to bring the "Touch of Gold" that helps you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

Profit from these benefits

1. Get Jobs Done Fast and Cool — high table speed, *125 feet per minute, maximum.* **2. Handle Tall Work Pieces** — greater vertical capacity, *15"*. **3. Get Lasting Accuracy** with guide-rail cross slide construction. **4. Control Vertical Feed Accurately and Position Fast** with two-speed .0001" increment hand wheel. **5. Benefit from Better Sighting and Loading** due to contoured splash guards. **6. True Forms, Even on Worn Wheels** because of recessed wheel spindle housing.

To Economize, Modernize with **NEW**

NORTON

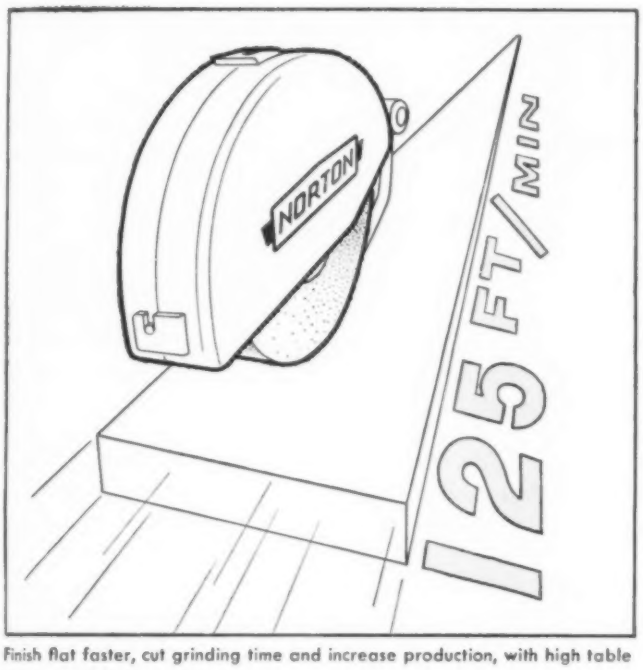
GRINDERS and LAPPERS

Making better products... to make your products better

NORTON PRODUCTS
Abrasives • Grinding Wheels • Grinding Machines
Refractories • Electrochemicals
BEHR-MANNING DIVISION
Coated Abrasives • Sharpening Stones
Pressure-Sensitive Tapes
District Offices
Worcester • Hartford • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5

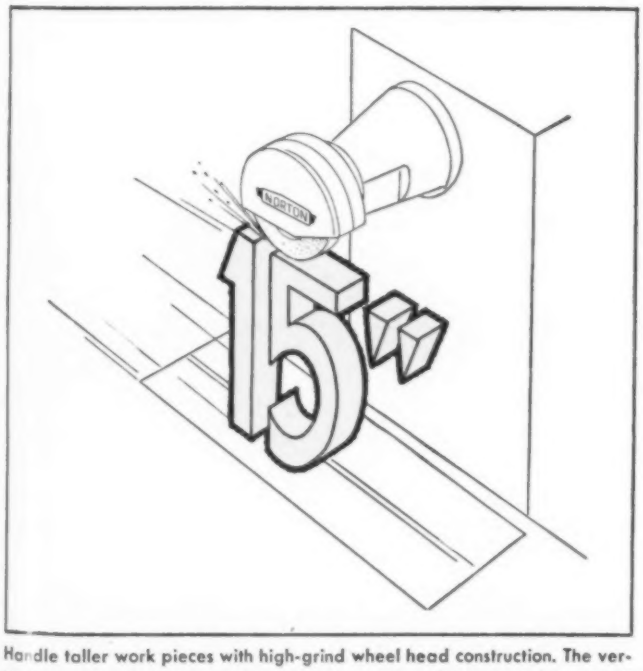
FASTER.... at lower cost

These and many other new features make this machine a "must" for your surface grinding jobs.



Finish flat faster, cut grinding time and increase production, with high table speed, 125 feet per minute.

Heat goes off in the chips, due to new, high table speed. This cooler grinding permits faster production on heat-sensitive metals.



Handle taller work pieces with high-grind wheel head construction. The vertical capacity from the table top to the bottom of standard full size 8" diameter grinding wheel is 15"

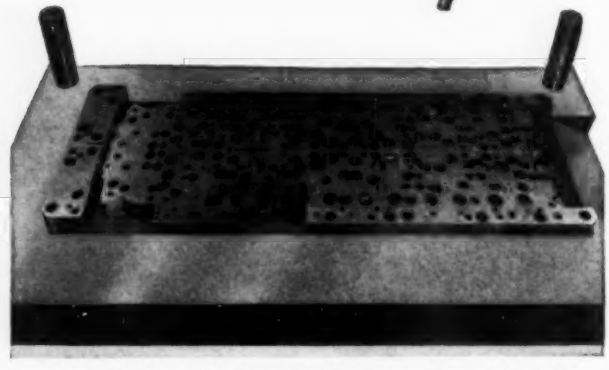
Widely spaced, flat ways and guide-rail cross slide design maintain cross feed accuracy, providing lastingly accurate grinding of shoulders or parallel surfaces.

H○LES

JIG GROUND with

Vulcanaire

Provide yourself with this inexpensive* instrument for use on your present equipment and JIG GRIND with a guarantee.



A seven station die from Vulcan's contract Tool Room (Your Tool Room in Dayton).

Standard sized punches and buttons were used. But since forming and piercing operations were involved, hardening of the sections was necessary followed by JIG GRINDING. Result: Close tolerances held easily and perfect progression throughout — another satisfied customer.

*Vulcanaire equipment pays for itself on the first job.

Borrow our instructive 11 minute movie on Jig Grinding.

SERVICES OF YOUR TOOL ROOM IN DAYTON
ENGINEERING • PROCESSING • BUILDING • TOOLS
DIES • SPECIAL MACHINES • VULCANAIRE JIG GRINDERS • MOTORIZED ROTARY TABLES • BREHM "SHIMMY" AND RELATED DIES • AUTOMATION

VULCAN TOOL COMPANY
743 Lorain Ave., Dayton 10, Ohio

VULCAN
tools

Letters to the Editor

Cleaning of Coolants

Please add my name to your mailing list for GRINDING and FINISHING magazine. I have a copy of the April issue and would like to obtain a copy of the March issue in order to get part 1 of the article on cleaning of coolants. Also, please put me down for three reprints of the entire series of these articles when they are available.

C. E. Brown
Harvard Engineering Co.
Cambridge, Mass.

We would like to obtain flysheets on your four-part article on "Recommended Methods of Cleaning Coolant on Grinding and Finishing Machines."

Thank you for your prompt attention.

James P. Boyle
Home Laundry Dept.
Hotpoint Co.
Chicago, Ill.

Why Standardize?

. . . This letter would be incomplete if I did not tell you personally how very much I appreciate your article, "Why Standardize?" in the August issue. All that you say about standardization is certainly true. In the merchandising field as it is handled in department stores, much stress is laid on the all-important "turnover," that is, in short, the basis of making money in that field and it applies to all sales fields where merchandise is stocked. Standardization does indeed permit a lower investment with resultant greater turn-over relationship. In short, it means "a short cut to making more money" . . .

. . . In any case, it would be helpful to have some enclosures of this excellent editorial to add to our mail when writing certain companies who could benefit so greatly by this standardization. I am sure you know what I mean and will guide me accordingly. Thanks sincerely and I shall hope to hear from you further before too long.

A. Shepard Titcomb
Pres. & Treas.
Abrasive Associates
Wallingford, Conn.

How Buick Saves Diamond Dust

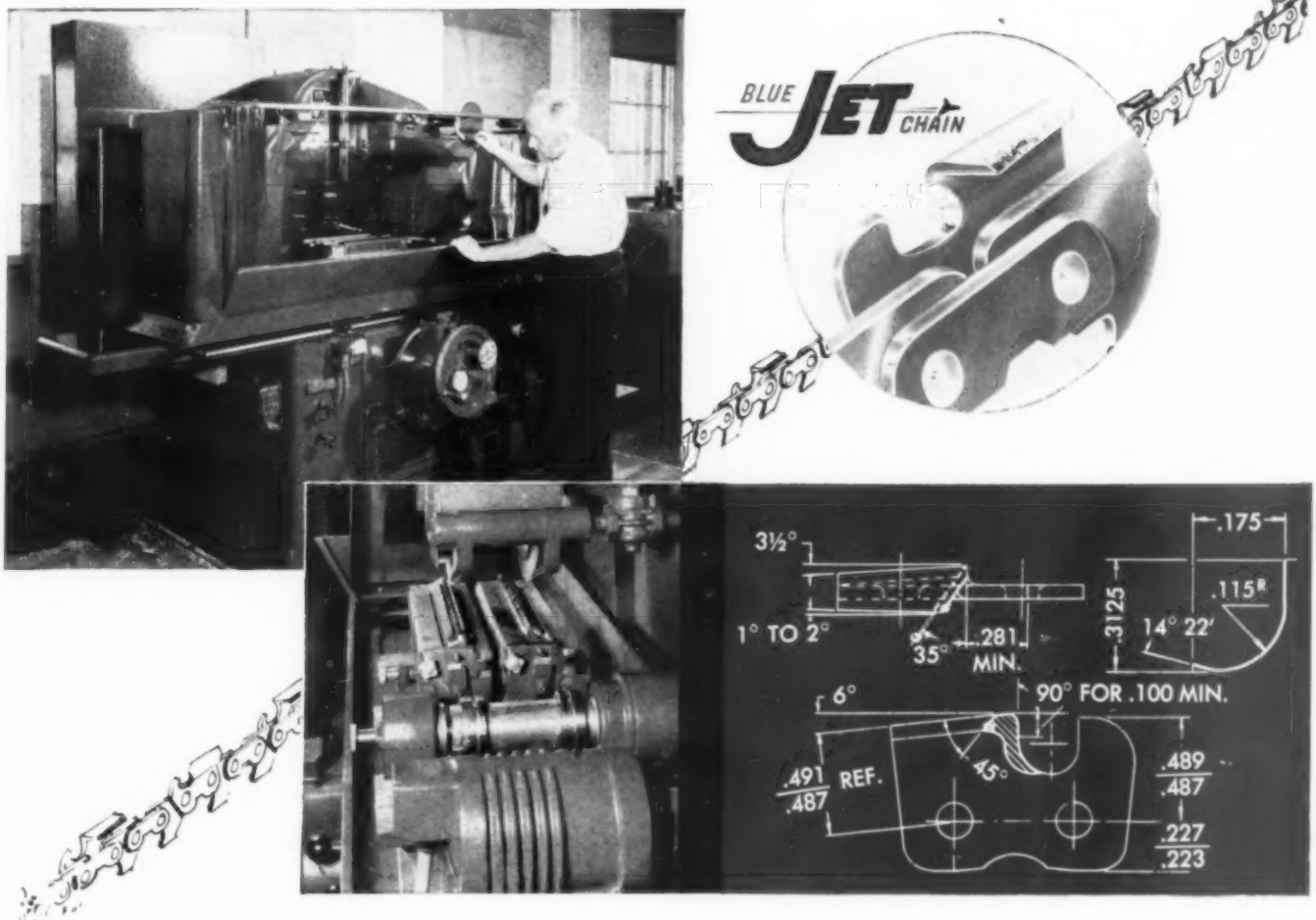
Your article, "How Buick Saves Diamond Dust," in the August, 1958 issue of GRINDING and FINISHING magazine is wonderful–you have presented the complete facts in as fine and concise a form as I have ever had the pleasure of seeing. In fact, the article is so good that I tried to phone you my congratulations this morning, but you were out.

Would you kindly quote me on the cost of reprints. I want to see that your beautiful article gets widest possible circulation.

My best regards to you and all the fine Hitchcock crew.

Frank R. Chase, Vice-President
Torit Manufacturing Co.
St. Paul, Minn.

Thompson TRUFORMING CUTS COSTS 60%



For 140 years, the policy of The Draper Corporation of Hopedale, Mass., has been to offer the highest quality product at the least possible cost.

Following this policy, its subsidiary, BlueJet Corporation, manufacturers of the famous BlueJet saw chain, installed a Thompson Truforming grinder to grind the cutting edges on their chain saw routers. These routers were formerly ground, piece by piece, by a force of 8 employees.

The Thompson Truforming operation is now cutting former grinding costs by 60%. 3 men only are now required for the operation. 40 L.H. and 40 R.H. routers are now ground simultaneously with one pass of the crush formed wheel, resulting in a day's production of over 12,000 pieces—many times that produced by the former method. Both the uniformity and sharpness of the routers have been greatly improved.

For 25 years, Thompson has pioneered and developed the modern advances in crush form grinding. If you have a time-saving, product-improving or cost-cutting problem in your operations, it will pay you to investigate the work Thompson Truforming grinders are now doing in plants all over the country. Our engineering experience is available to you without obligation. Write for Catalog T558.

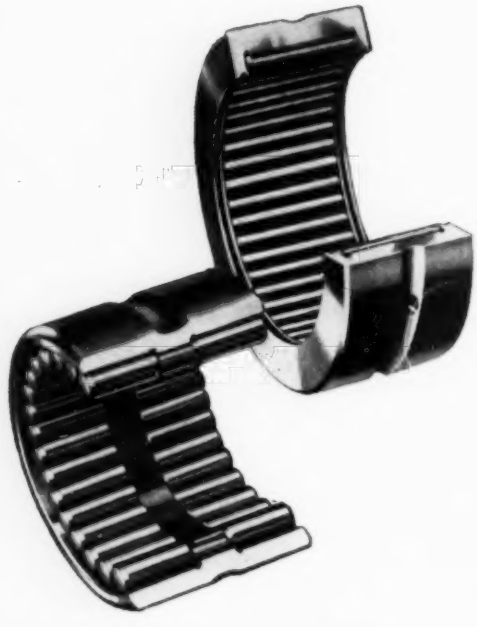
"Keep Thompson in mind for the daily grind"

THE THOMPSON GRINDER COMPANY

SPRINGFIELD, OHIO

Thompson SURFACE GRINDERS

Bryant CENTALIGN Internal Grinders Increase Bearing Race Production up to 50%



The results obtainable with Bryant CENTALIGN Internal Grinders are illustrated by the case of a well-known manufacturer of precision roller bearings, who recently installed a battery of CENTALIGNS in his plant.

Previously, production difficulties had been posed by bearing design, and the necessity of adherence to very close tolerances. Accordingly, the manufacturer, in selecting his new production equipment, paid special attention to the factors of high production capability, extreme accuracy, and broad versatility.

After exhaustive investigation, Bryant CENTALIGNS were chosen over all competitive grinders. The wisdom of this choice is shown by the results: production increased up to 50% on varied lots of 5000 to 50,000 pieces. Accuracy is held well within specified tolerances.

The unique engineering features of the Bryant CENTALIGN offer *you* top production efficiency, too. Write for detailed literature on Bryant CENTALIGN Internal Grinders.

BRYANT Chucking Grinder Co.

85 CLINTON STREET, SPRINGFIELD, VERMONT

Offices: Indianapolis • Cleveland • Chicago • Detroit • Mt. Vernon, N. Y. • Philadelphia

Internal Grinders • Granite Surface Plates • Magnetic Drums for Computers • Special Machinery

For information about any advertised product, see the Advertisers Index and Action Card inside back cover

For accurate, economical production on your centerless grinding machines . . .

CORTLAND CENTERLESS GRINDING WHEELS

Made to Order

Here at Cortland, this phrase means just what it says. We welcome tough grinding problems because our engineers can find ways to solve them and a problem solved means a customer satisfied.
May we help you?

STANDARD SIZES CARRIED IN STOCK

Centerless grinding is one of the important factors enabling "the wheels of industry" to turn smoothly. Shafts, bearing races, rollers, rods, pins, etc. are ground to exacting tolerances when wheels are *right for the job.*

You'll find wheel-making at its best in Cortland Centerless Grinding Wheels. They hold shape, yet cut freely for rapid and accurate production with minimum dressing.

You can secure Cortland Grinding Wheels in the *exact* combination of abrasive grade and structure for the material to be ground, stock to be removed, finish required and tolerances specified.

And once *your* Cortland wheel specification has been established, you can reorder with perfect assurance that each succeeding lot will be exactly like those which have given you such satisfactory performance.

Popular sizes — 20 x 4 x 12, 20 x 6 x 12 and 24 x 6 x 12 — in standard markings are carried in stock. Other gradings and/or sizes can be produced quickly to order in regular "A" or "FA" Oxaluma (aluminum oxide) or "C" Carbora (silicon carbide) in either vitrified or resinoid bond.

CORTLAND **CORTLAND GRINDING WHEELS CORP.**
Chester, Massachusetts

wherever abrasive operations are performed

Grinding and Finishing Around the Country

Firebird III—GM's Space Age Car

A new experimental Firebird–the first space-age inspired car–has been built and tested successfully by General Motors, John F. Gordon, GM President, announced.

Firebird III is reported as the first car ever designed around a single stick control system which eliminates the conventional steering wheel, brake pedal and accelerator. It measures only 44.8" high at the top of the passenger canopies and 57" high at the tail. A cluster of seven fins at the rear serve as aerodynamic stabilizers and also emphasize the forward thrust of its rear-positioned, improved Whirlfire gas turbine engine.

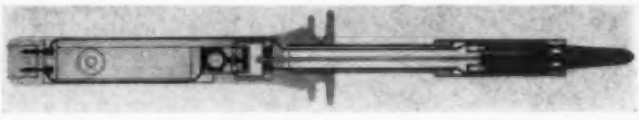
Rear view shows the cluster of seven fins which serve as aerodynamic stabilizers and also emphasize the forward thrust of its rear-positioned, improved Whirlfire gas turbine engine.

Tools of the space age–electronics, transistors and computers–are used to guide the car automatically.

The first public display of the car will be at the General Motors Motorama of 1959 which opens October 16 at the Waldorf-Astoria Hotel in New York City. The Motorama will move to the National Guard Armory in Boston where it opens November 8.

HOUSTON—Solar Aircraft gas turbine engines are powering the Jupiter, new Sewart Seacraft crew boat for off-shore oil operations. The 55-foot boat, built by Sewart Seacraft, Berwick, La., attains cruising speeds of 35 miles an hour, powered by two 500 hp gas turbines. The advantages have been found to be extreme speed, no engine vibration, and rapid acceleration. Several Solar gas turbines are now powering Navy vessels, but this is the first commercial application. (Solar Aircraft Co., San Diego 12, Calif.)

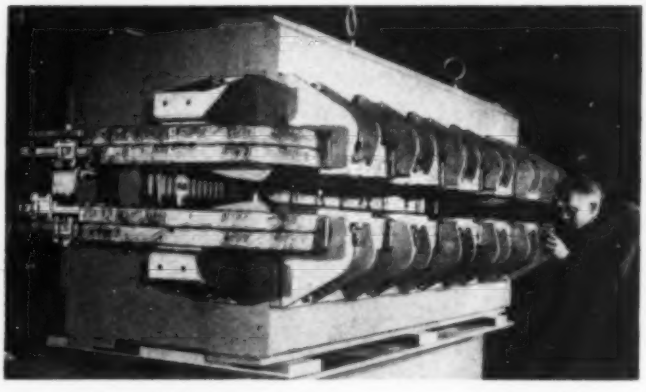
Sketched is a new soldering iron which automatically controls the soldering iron temperature. The small dark section at the interior of the tip of the iron is a magnetic



alloy. When this alloy is treated to a predetermined temperature, it loses its magnetic qualities and the spring at the other end of the alloy pulls the alloy from the tip, thus breaking electrical contact. Weller Electric Corp. of Easton, Pa. developed the new iron. Allegheny Ludlum Steel Corp. supplied the stainless steel tubing used in the iron.

$25 Million Synchrotron to Smash the Atom

A mammoth new proton synchrotron, now being built at Brookhaven National Laboratory on Long Island, is the world's largest and most powerful atomic machine. It will be ready for use in 1960, and will cost about $25 million. As a result of the research work at Brookhaven, dozen of industries might change their present day thinking, new industries might arise, and medicine come up with startling changes.



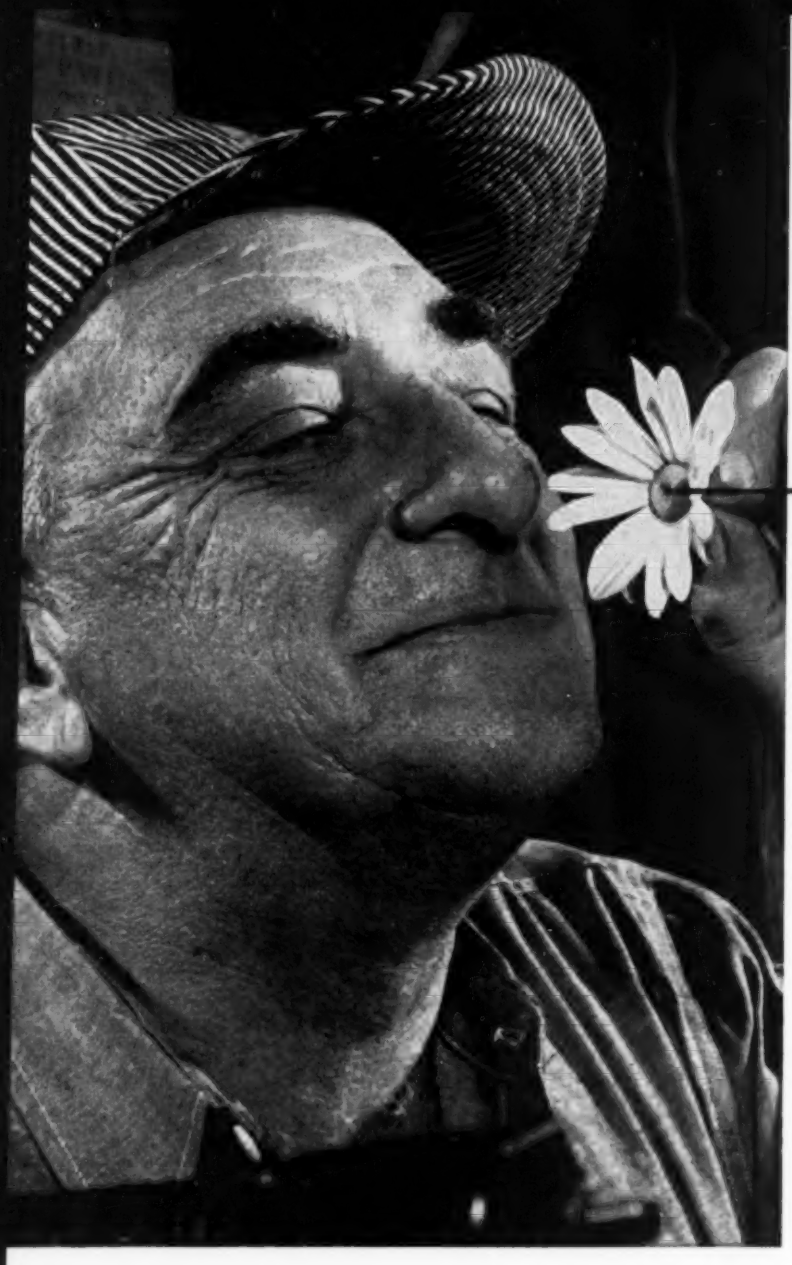
One of the 240 giant magnets used at the Brookhaven National Laboratory which will be used in the new mammoth synchrotron.

The synchrotron will accelerate protons to 25 or 30 billion volts of energy. The higher the energy of the particles, the faster they travel, and the greater the possibility of breaking the nucleus. A new concept, called strong focusing, depends on huge magnets holding the electrically charged atomic (protons) "bullets" on course, and using these particles to hit and break the nuclei of other atoms. The nuclear properties can then be studied.

DISCOVERED!

...new way to keep cutting fluids as fresh as a daisy!

SEE NEXT TWO PAGES



DISCOVERED...A NEW WAY TO KEEP COOLANTS FRESH AS A DAISY!

Shop tests show ELCIDE 75 keeps cutting fluids fresh longer than ever before

Now . . . there's a new and better way to control the harmful bacteria that cause oil-water emulsion breakdown, acidic corrosion, and rancid odor. It's Elcide 75 . . . a product directly related to one of the most powerful bacteria killers used in medical science today . . . a material that has proved itself in the exacting field of surgical practice and has now been adapted to solve the problem of bacterial growth in soluble oil emulsions.

A large Midwestern manufacturing plant tested Elcide 75 under actual job conditions.

They found that one ounce of Elcide 75 added to each 4 gallons of oil-water emulsion . . .

extended useful life of the emulsion 5½ times . . .

greatly reduced cutting oil requirements . . .

delayed odor and emulsion break for 22 weeks, while untreated machines had to be dumped at the end of four weeks . . .

proportionately reduced down time for recharging . . .

was safe and nontoxic . . .

eliminated bacterial slime and reduced acidic corrosion . . .

drastically reduced their disposal problems.

WHAT ELCIDE 75 CAN DO FOR YOU

This combination of inhibitors can extend the life of your oil-water emulsions 2 to 4 times, or more, and can dramatically cut your oil-concentrate purchases. At the same time, production will increase because you have less down time for recharging.

ELI LILLY AND COMPANY · AGRICULTURAL AND INDUSTRIAL PRODUCTS DIVISION
INDIANAPOLIS 6, INDIANA TELEPHONE: MELROSE 6-2211

This is one of the causes of emulsion trouble. These are *Pseudomonads*, one of the many harmful types of bacteria found in oil-water emulsions. These, and other bacteria, enter emulsions through the air, water, and plant debris. They set the stage for a chain reaction which causes odor, corrosion, and costly emulsion breakdown.

Prior to Elcide 75, no single inhibitor was able to control the full range of bacterial growth. Certain of these bacteria quickly develop resistance to single inhibitors and continue to flourish. Now, Elcide 75 controls a wider range of bacteria because it is an effective combination of bactericidal agents. This has been proved in shop tests.

In certain areas where waste-oil disposal is a problem, the use of Elcide 75 proportionately reduces the size of the problem.

Elcide 75 also contributes to better products and longer machine-tool life. Bacterial contamination causes acidic decomposition of the emulsion and sets up conditions for corrosion. By controlling the bacteria, you eliminate this source of trouble.

Employees like Elcide 75 because, when added to the emulsion, it is completely safe. In another recent test involving over 1000 machines, it was shown that Elcide 75 was safe, nontoxic, and harmless to sensitive skin. It also reduces the chance for bacterial infection caused by contaminated emulsion.

YOU KNOW WHAT YOU GET WHEN YOU BUY ELCIDE 75

With Elcide 75, you know you have the proper amount for effective treatment because you add it to your emulsions right in your plant. The standard recommendation is one ounce of Elcide 75 per 4 gallons of oil-water emulsion.

PROVE IT TO YOURSELF . . . TRY ELCIDE 75 IN YOUR PLANT

The best way to determine the value of Elcide 75 is to try it under your normal plant conditions, using your regular oil-water emulsion. After you've had an opportunity to compare results, we believe you'll agree that Elcide 75 is a valuable discovery that will greatly increase your plant efficiency.

PRODUCT SPECIFICATIONS ELCIDE 75

(Lilly's brand of bactericide for cutting fluids)

Active Ingredients—Thimerosal (Sodium Ethylmercuri Thiosalicylate) and Sodium o-phenylphenate.

Package	Price per Gal.
1-gallon polyethylene . . .	$8.50
5-gallon polyethylene . . .	$8.00
55-gallon stainless steel . . .	$6.50

Terms: 1%, 10th prox.; net, 30th prox. F.O.B. Indianapolis. Transportation paid via carrier of our selection.

For further information or to place your order, phone or write.

ELCIDE 75™

PATENT PENDING

Lilly

wherever abrasive operations are performed

News of Metalworking

U.S. Should Develop Int'l Standards For Small Tools

NEW YORK: The American small tool industry may find its export market shrinking because the United States is not active in the development of international standards for small tools. This is the opinion of Frank P. Brown, National Bureau of Standards, who attended this year's meeting of Technical Committee 29 on Small Tools of the International Organization for Standardization, in Berlin, Germany. He reports on the meeting in the August issue of *The Magazine of Standards*, published by the American Standards Association, 70 East 45th St., New York 17, N.Y.

CEM Group Considers Industrial Uses Of Atomic Radiation

NEW YORK: Corporation presidents attending the CEM (chemicals, electronics, metallurgy) Group meeting were encouraged as to the long-range potentials of industrial uses of massive radiation, and believe that the results of the CEM Group study for the Atomic Energy Commission may lead ultimately to significant economic gains for the United States. The Group Executive Director, Rear Admiral John D. Small, pointed out that use of nuclear radiation energies in process industries, such as the chemical industry, is a great but comparatively unexplored potential of the peaceful atom.

All-Aluminum Engine Checks Performance In Power Plants

WILMINGTON: Looking toward possible future needs of the automotive industry, du Pont's Petroleum Laboratory has installed an all-aluminum test engine to check performance of all types of gasoline and oil additives in lightweight power plants.

The new unit, a four-cylinder engine duplicating a companion test engine of conventional cast iron and steel, not only will provide comparative performance and combustion data for the oil and motor industry, but will assist in the laboratory's development of new products to meet lightweight engine requirements.

Technical Papers For AIME Metallurgical Meet Oct. 27-30, 1958

NEW YORK: The Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers will hold its Annual Fall Meeting Oct. 27-30, in the Carter Hotel, Cleveland. Some of the numerous discussions and papers are: The IMD Semiconductors Committee Symposium will discuss "Government-Sponsored Research on Semiconductor Materials" on Oct. 27; the Titanium Symposium Oct. 28 will discuss "Price, Quality, and New Process Prospects for Titanium Sponge, Ingot, and Billet," and the Nuclear Metallurgy Symposium will have papers on "Ceramic Base Elements" and "Metal Base Fuels and Jacket Components."

National Conference On Standards Nov. 18-20, 1958

NEW YORK: "Standardization–What's In It For Me?" will be the theme of the Ninth National Conference on Standards to be held at the Hotel Roosevelt in New York, Nov. 18-20. Among the industries discussing the benefits derived from standards will be forgings and castings, nonferrous metals, plastics, exports, nuclear energy, textiles, to name a few. Also on the program are sessions of interest to the purchasing agent and the military engineer.

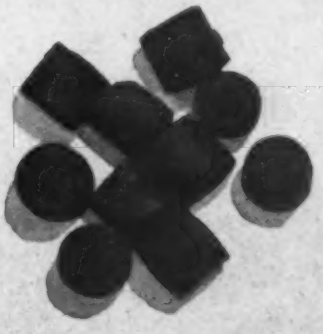
NEW

PRECISION-CONTROLLED TUMBLING MEDIA

for faster... more uniform barrel finishing at low cost

ALUMINUM OXIDE NUGGETS

Provide a fast cutting action for grinding, deburring, and polishing and require no breaking-in period. Their long-wearing qualities help minimize the problem of lodging in parts.

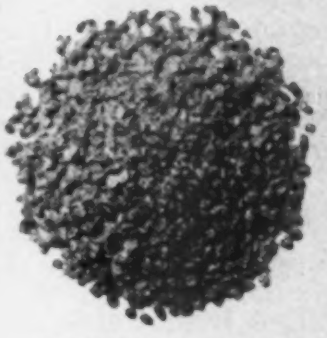


ALUMINUM OXIDE VITRIFIED PELLETS

Controlled bonded shapes formulated to give maximum "cut" with minimum wear. They are particularly advantageous where lodging must be prevented and where a rapid rate of cut is desired.

"CARBO-RUBS" RUBBER BONDED MEDIA

Parallelogram-shaped rubber bonded media. They are used primarily where the burr is light and action must be gentle. Used to produce a high "color" and to remove burrs from non-ferrous parts.



ALUMINUM OXIDE GRAIN

Designed for the economical finishing of small metal parts. Also used as an additive to augment the cut of various other tumbling media. Coarser sizes are used in the new "spinner-type" finishing equipment.

"CARBO-BRITE"

An electric furnace product having a fine crystalline structure and slow wearing qualities which adapt it to burnishing operations where high color is desired.

Manufacturers of metal parts which require deburring, scale removal, polishing, honing, blending, or burnishing operations can now produce finer finishes *at lower costs* by using the new *precision-controlled* Tumbling Media by CARBORUNDUM. New improvements in the manufacture of abrasive media at CARBORUNDUM assure exceptionally high output per barrel with absolute uniformity of parts and finishes. Even unusual shapes and sizes can be mass-finished to precision tolerances... at a fraction of the time and cost. CARBORUNDUM's wealth of abrasives know-how is available to assist you in working out your own parts finishing problems.

Write for this
FREE
Booklet

A practical guide describing barrel finishing of metallic parts on a mass production basis with Tumbling Media by CARBORUNDUM.

THE CARBORUNDUM COMPANY
Dept. GF 83-817, Niagara Falls, New York

Tell me more about "Precision-controlled" Tumbling Media.

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COMPANY _____

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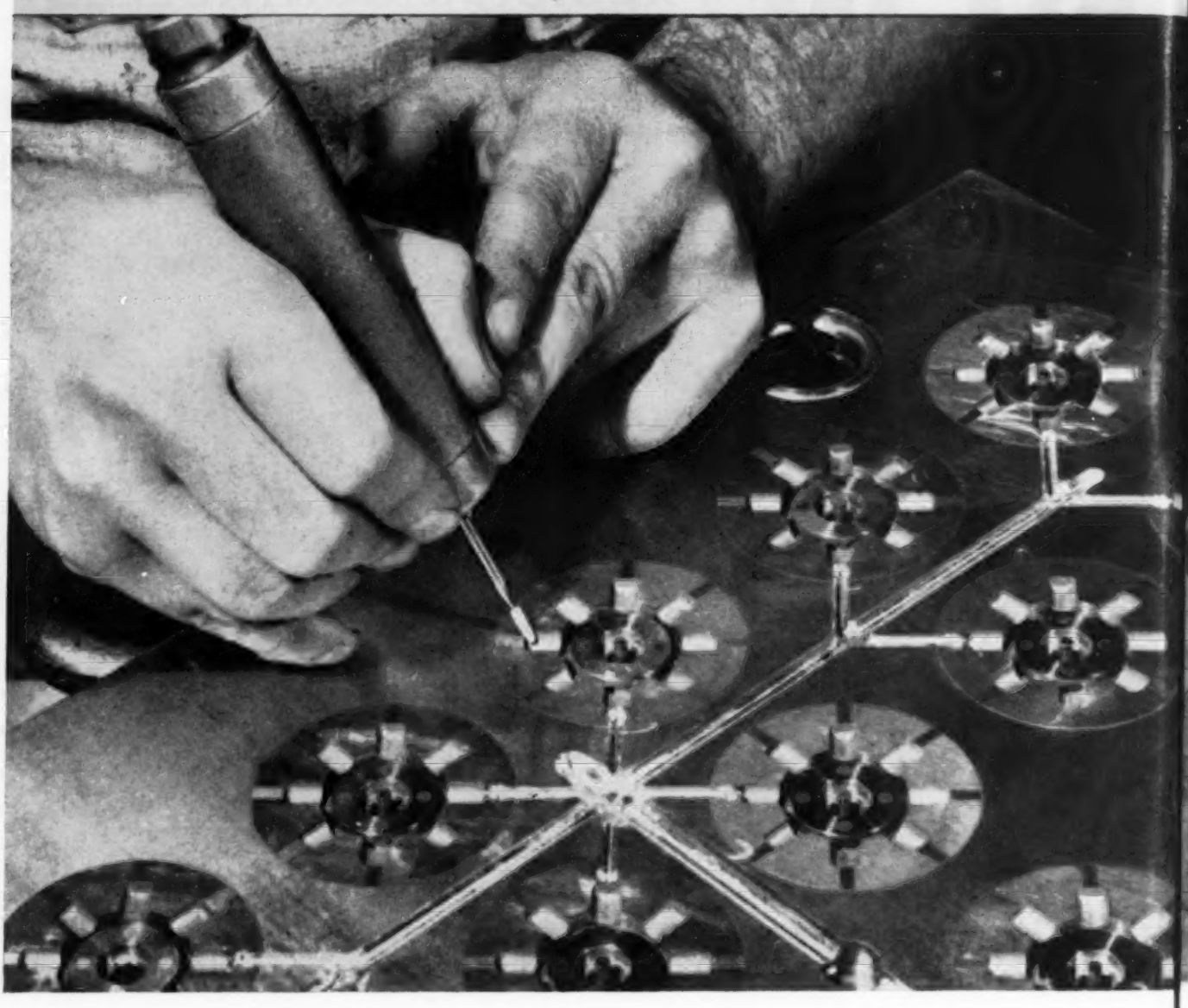
FOR EXPERT ADVICE... Ask the Man From

CARBORUNDUM

REGISTERED TRADE MARK

32 ALUNDUM* Abrasive for your tool and die jobs



Here's how Norton keeps

"Making better products... to make your products better"

Our motto is constantly being proved by our customers. Norton mounted wheels, for example, are hitting new highs in grinding efficiency. Outstanding new developments in abrasives and wheel construction eliminate loading and glazing, assuring best possible results in:

TOOL AND DIE GRINDING

Norton mounted wheels with sharp 32 ALUNDUM abrasive and VBE bond are the very best performers.

Advantages: Wheels need no costly dressing, hold form and give constant cutting action from start to finish — right down to the mandrel. "Best I ever had," reports a long experienced die finisher.

ROUGH GRINDING

For steel castings and weldments, mounted wheels of tough 44 ALUNDUM abrasive with VBE bond, and metal-mounted, are unequalled.

For snagging cast iron, wheels of sharp 32 ALUNDUM abrasive with VBE bond, and metal-mounted, outperform silicon carbide wheels consistently.

Advantages: Norton wheels give you the fastest cutting rate, with a marked increase of stock removed per wheel. "There has never been anything like them for speed and economy in our snagging," says the foreman of a leading foundry.

32 or 44 ALUNDUM Abrasive for your rough grinding

METAL-MOUNTING — *Another Norton Exclusive* — *You throw nothing away but the mandrel!*

Norton does it again! The mounted wheels are so securely anchored to the mandrel — *you use all of the abrasive!* No waste . . . all work! This radically improved method of locking the abrasive body to the mandrel is used on mounted wheels in most sizes and shapes, 5/16" diameter and larger. Molten metal, injected into the abrasive recess at high pressure, does it — and does it fine!

Every Norton mounted wheel is accurately trued *after mounting* on rust-proof stainless steel mandrels. Developed to increase the time-and-money-saving "Touch of Gold," Norton mounted wheels are stocked in approximately 200 standard shapes and sizes. See your Norton Distributor for prompt deliveries. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

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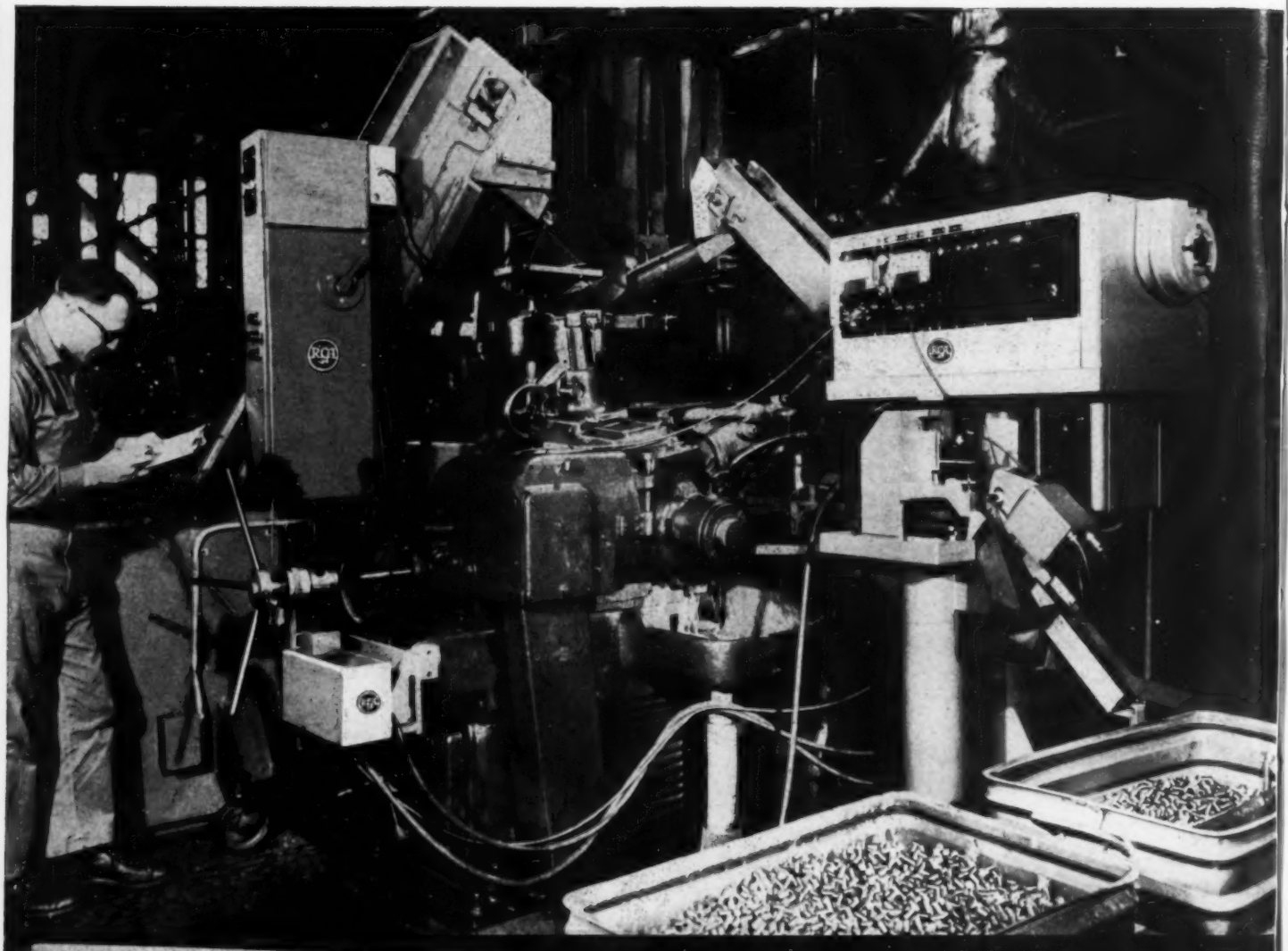
ABRASIVES

W-1879

Making better products . . . to make your products better

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — **BEHR-MANNING DIVISION** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

NOW...A PROVEN



Control Panel Indicator Lets You Watch Size and Taper.

Push-Button Control for automatic or manual operation.

Signal Lights Flash
—as correction is called for.
—when parts are out of size and being rejected.
—when parts are in size.

Classifier Meter shows finished part size.

Program Meter shows amount of correction being made.

BACKED BY YEARS OF EXPERIENCE IN ELECTRONICS AND

CENTERLESS GRINDER CONTROL

WITH 5 BIG ADVANTAGES!

1 **Uniform Accuracies**—Produces consistently uniform parts. Eliminates intermediate grinding operations.

2 **Automatic, Self-Compensating** — Operates automatically, with 100% repeatability. Grinder bed automatically advances to compensate for wheel wear and to maintain parts at required size. Corrections controllable from .000025 to .0005. The RCA Control in no way limits capacity of grinder.

3 **"Space-Age" Tolerances**—Even the most critical tolerances demanded for precision equipment can be held by the RCA Grinder Control—tolerances as close as 50 millionths.

4 **Practical for Short or Long Runs**— Complete set-up time for the Control takes less than three minutes. After installation of Control, the grinder can be operated automatically or manually by merely pushing button on panel.

5 **Saves Money, Eliminates Scrap**— Production rate increases of 300% have been achieved. Scrap is eliminated; out-of-size parts are held to barest minimums; unit costs are lowered; users report greatly extended wheel life.

PLUS THESE FEATURES:

- Easy installation—requires no modification of grinder.
- One operator can oversee a group of control-equipped machines.
- Control can be moved from one machine to another.
- Minimum maintenance . . . components sealed against chips, dust and moisture.

RCA also manufactures a line of electronically controlled systems for integrating and automating assembly lines, elevating hoppers, parts feeders and orienters, automatic high-speed hardness testers, assembly machines and inspection devices.

30-DAY TRIAL INSTALLATION

As evidence of our confidence in the RCA Grinder Control, we will—on the recommendation of our field engineers—install a control system in your plant on a *trial basis for 30 days!* Call in one of our men soon to evaluate your grinding operations and make recommendations. This offer expires December 31, 1958, so mail the coupon today for quick action.

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RADIO CORPORATION of AMERICA

INDUSTRIAL AUTOMATION EQUIPMENT
DETROIT, MICHIGAN

AUTOMATIC CONTROL....

Radio Corporation of America
Industrial Automation Equipment
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Please send me:

☐ Illustrated brochure on Electronic Grinder Control.

☐ Complete information on other parts handling, testing or inspection equipment.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE ___ STATE _____

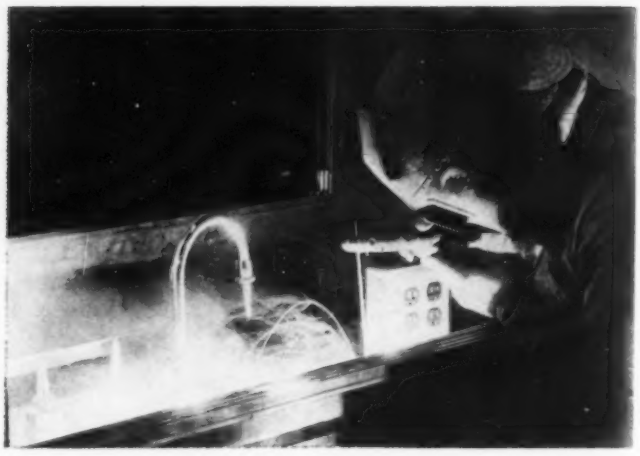
☐ Have representative call

News of Metalworking . . .

AEC Unfolded Radiochemical Tracer Techniques at Atoms For Peace Exposition

Latest U. S. techniques in the manufacture and use of radioactive isotopes in biochemical research were shown by the Atomic Energy Commission in a three-phase exhibit during the Second United Nations International Conference on Peaceful Uses of Atomic Energy, which convened at Geneva, Switzerland, September 1.

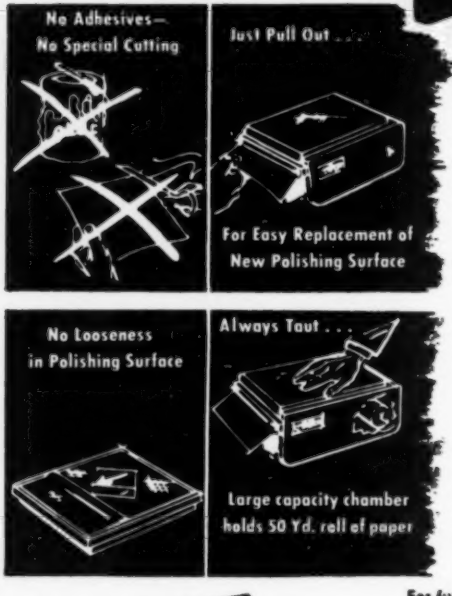
At the heart of the exhibit, in a fully equipped radiochemical tracer laboratory, AEC personnel demonstrated the radioactive labeling of organic compounds and showed results obtained through research with the materials.



Inert gas shielded arc welding was used to fabricate stainless steel hood for the exhibit. Loaned at the request of the AEC by S. Blickman, Inc., of Weehawken, N.J., the laboratory equipment was predominantly stainless steel for easy decontamination and safety to personnel and observers.

Here's How Simple Polishing Can Be . . .

with the JOHN CRANE *Portable* Polishing Stand



Yes! Here's an effective method for handling polishing paper that has a definite place in many inspection departments and mechanical laboratories. The JOHN CRANE Portable Polishing Stand provides in a matter of seconds a wrinkle free 12" x 12" section of paper held absolutely taut over a metal stage that has been lapped to provide a perfect polishing surface. It also permits the instant replacement of this section of paper once it becomes worn.

For further details and other facts on this very practical tool, write for Bulletin L-410.

Lapmaster DIVISION

Crane Packing Company
6417 Oakton St., Morton Grove, Ill.
(Chicago Suburb)
In Canada: Crane Packing Co., Ltd., Hamilton, Ont.

CRANE PACKING COMPANY

Carborundum Builds New Boron Carbide Plant

The Carborundum Company's expanded facilities for the manufacture of boron carbide in Niagara Falls, N.Y., are now in full operation.

Joseph S. Imirie, Vice-President of the company and General Manager of the Electro Minerals Division, said that the firm had produced boron carbide for some time; however, greatly increased demand resulting from accelerated technological changes in industry's requiring the unusual combination of properties of boron carbide necessitated the addition of furnace facilities and installation of a new boron carbide grain plant in 1958. The new plant employs novel mineral dressing and other new techniques and is supported by a new products laboratory which contributes to rigid quality control of boron carbide products in the new plant.

Engine Research Advances

Research on Diesel, free piston and gas turbine engines is advancing at a rapid pace, General Motors technical expert Dr. Peter Kyropoulos said at the annual meeting of the Society of Automotive Engineers in Los Angeles. "The Diesel has not yet exhausted its potential for development," remarked Kyropoulos. The gas turbine was spoken of as "here in a competitive form and shows great promise in the size range beyond the Diesel engine."

"Impossible" Forging Jobs Solved By Steelmaker

Labeled "impossible" or "not feasible" by many, re-forming new dimensions into large forged steel nozzles used in separating U-235 and U-238 at three Atomic Energy Commission plants was tackled and completed successfully through the ingenuity of the Standard Steel Works, Burnham, Pa., specialty steelmaking division of Baldwin-Lima-Hamilton Corporation.

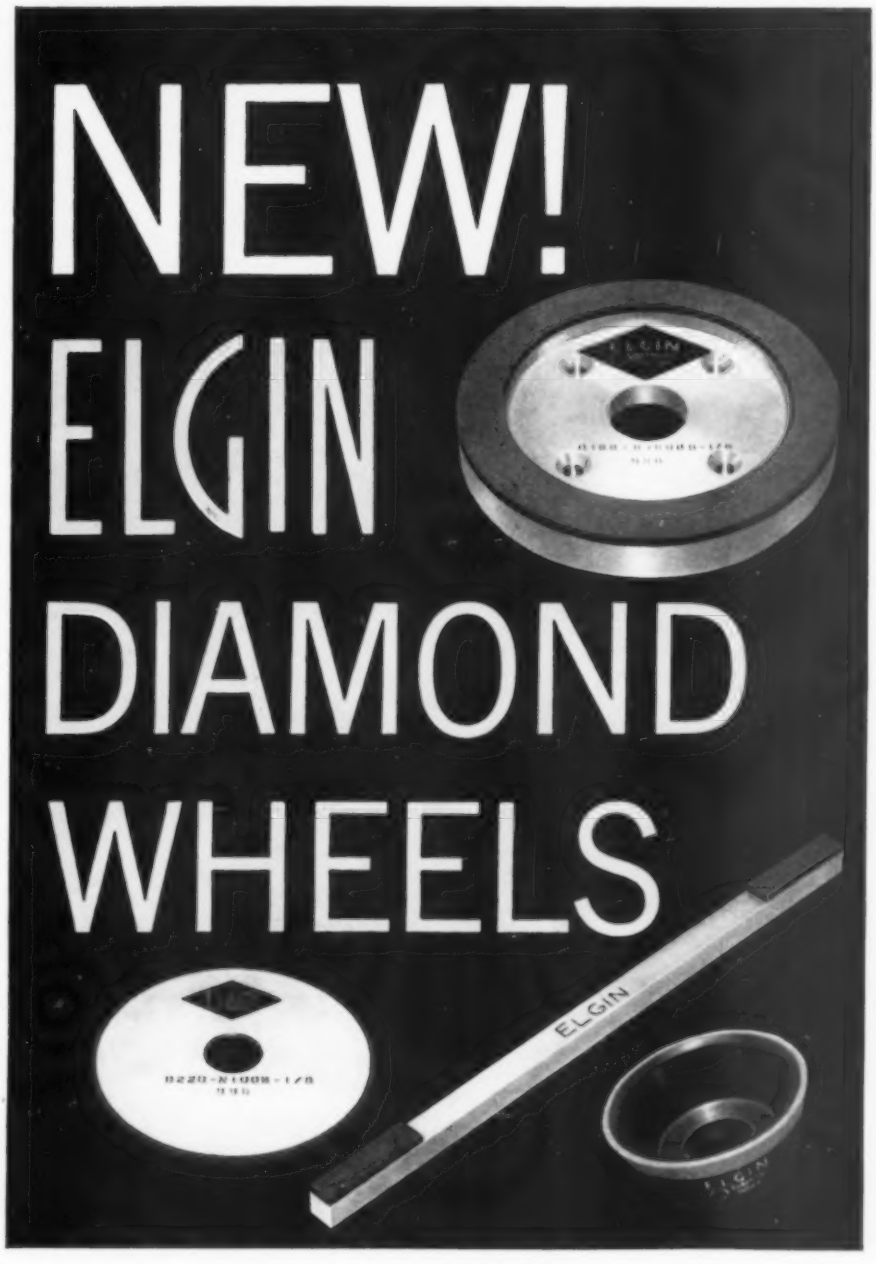
The large salvage operation involved more than 1000 forged steel nozzles. Research had shown that if the radius of the nozzle were increased to 7½", turbulence would be greatly reduced. The solution was the re-forming of the existing nozzles.

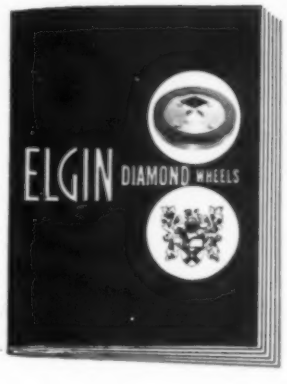
Producing the two dies needed for the job required intricate contouring. After being heated to approximately 1800 degrees F., the nozzles were shaped on a 2500-ton steam-hydraulic press. The operation was a complete success—the nozzles were re-formed to the 7½" radius to as low as ⅛" tolerance.

Intricate dies, matching nozzles' elliptical shape and incorporating new 7½" flare radius, required two months of construction. Here, upper and lower dies are in place on the steam-hydraulic press. Nozzle, heated to 1800° for the re-forming forging operation, is in position on lower die.

YOUR QUESTIONS ANSWERED

Send your questions and problems to GRINDING and FINISHING. Your problems may be similar to many others so let's get them out in the open. Our new question and answer section will attempt to answer the bothersome detail problems as well as the major difficulties. Please include all the facts involved in your question.





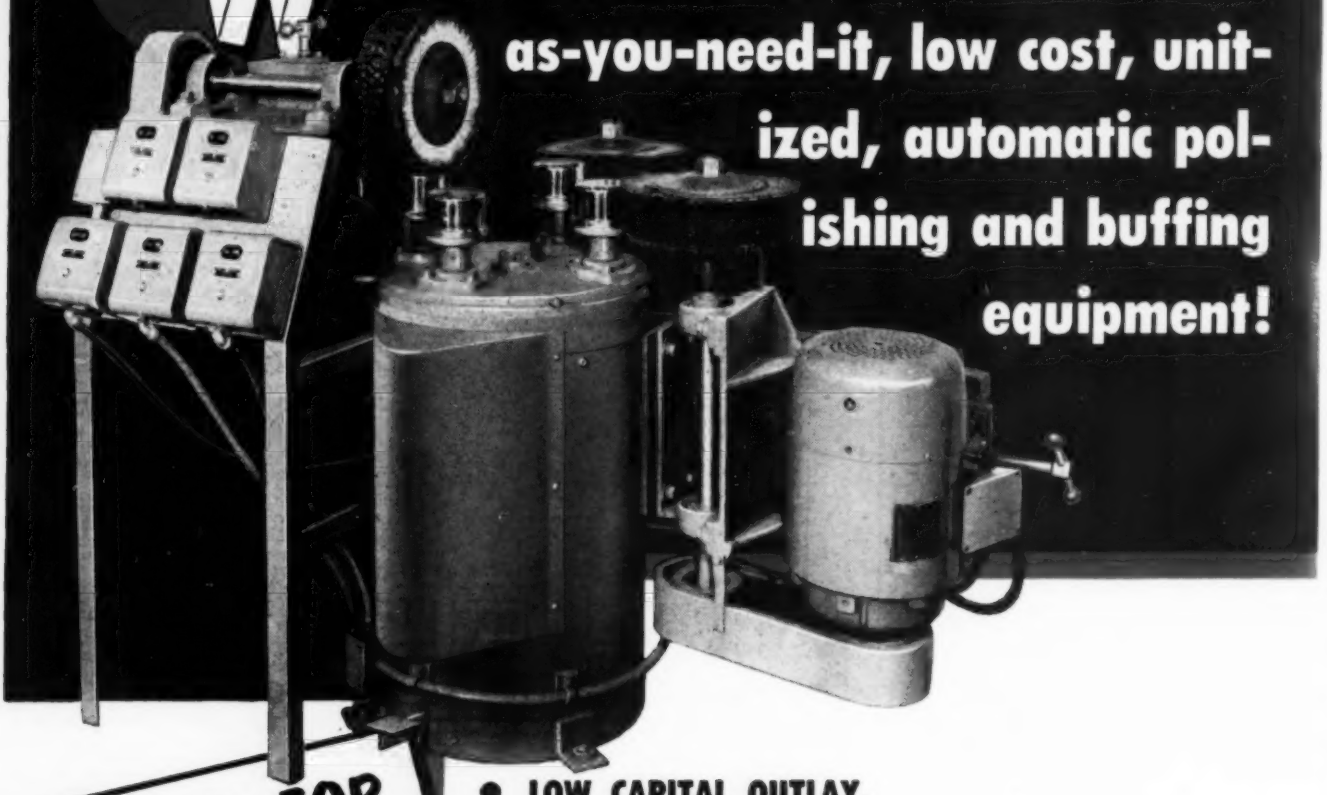
Now – ELGIN offers you a complete line of Golden Circle Diamond Wheels with *guaranteed diamond content*

Diamond wheels—every shape, every size—resinoid, metal, or vitrified bonded—they're all available from Elgin! Guaranteed diamond content means more pieces ground per wheel, more return on your wheel-dollar. Consult an Elgin field engineer—his broad abrasives experience will help you select the right grit, wheel-shape, and bond—the wheel that will keep your grinding costs down. Our new diamond wheel catalog greatly simplifies ordering. Write for it today.

Abrasives Division
ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS

MURRAY WAY announces . . .

a practical, new idea in add-as-you-need-it, low cost, unitized, automatic polishing and buffing equipment!



IT PAYS FOR ITSELF!

- LOW CAPITAL OUTLAY.
- EXPANDS INEXPENSIVELY TO YOUR NEEDS.
- DOUBLES OR TRIPLES PRODUCTION.
- IMPROVES QUALITY—CUTS COST.
- REQUIRES ONLY 6′x8′ FLOOR AREA.
- ADJUSTABLE, AUTOMATIC OPERATION.

Murray-Way's years of specialized experience in automatic polishing and buffing equipment are at your service. The Junior Automatic is only one item in our line of standardized equipment for specialized applications. We invite your inquiries and special equipment problems.

Write today for detailed literature and prices.

A small automatic with "big" abilities. The Murray-Way Junior Automatic is designed to economically handle a few pieces or a large production. It's ideal for big or small plants.

Available with basic equipment at a fraction of the cost of conventional automatic or semi-automatic buffing and polishing machines, the Junior Automatic can be equipped with standardized additional units, as-you-need-it, to handle practically any job in the place.

Adjustable heads available with vertical, horizontal and angle wheels or abrasive belts. Adjustable cycle and dwell. Automatic wheel lift-off and other features usually available only on bulky, expensive automatics.

MURRAY WAY CORPORATION

P. O. BOX 189 MAPLE ROAD E. • BIRMINGHAM, MICH.

(PATENT APPLIED FOR)

NEW MANHATTAN SAFETY BACK FLARED CUP

Not simply a new safety "feature" . . . not merely a design "improvement." Here's a *totally new concept* of flared cup wheel design *and* construction . . . developed by Manhattan engineers to give the greatest safety and performance advantages possible for flared cup wheel users. Manhattan's revolutionary SAFETY BACK Flared Cup puts portable wheel *safety* where it counts the most—in *original* strength and breakage resistance!

SAFETY BACK, far surpasses such safety features as anchor bushings, safety rings, special hub mountings, or ordinary revolving cup guards. With SAFETY BACK, steel covers the *entire* back of the flared cup . . . extends down the side to offer a degree of reinforcement and breakage resistance never before possible!

NO OTHER WHEEL—AT ANY PRICE—OFFERS THESE EXCLUSIVE FEATURES

- **Greatest Initial Strength**
- **Highest Safety Factor**
- **Easy Mounting—Easy Operation**
- **Improved Mounting Base**
- **One Piece Assembly**
- **Requires No Adjustment**

Only SAFETY BACK gives you these features—*plus* Manhattan's custom-engineered abrasive bond for *faster* removal of *more* metal on your particular job—at no additional cost! For "More Use per Dollar" in portable grinding operations, you can't get a faster cutting, longer lasting—*safer* wheel than MANHATTAN.

Let a Manhattan abrasive wheel engineer show you the advantages of SAFETY BACK Flared Cups, and other types of Manhattan high speed, heavy duty abrasive wheels. Write for Bulletin 7157.

RM-752RI.

GRINDING WHEEL INSTITUTE MEMBER

WRITE TO THE ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

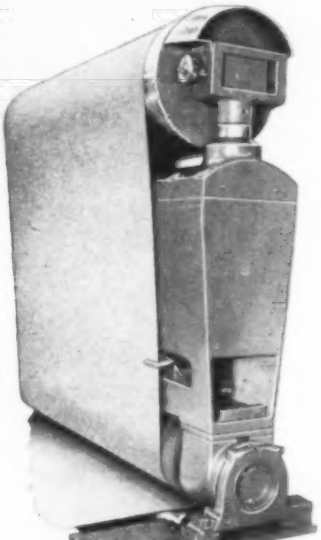
RAYBESTOS-MANHATTAN, INC.

Belts • Hose • Roll Covering • Tank Linings • Industrial Rubber Specialties • Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

HILL Sheet and Plate polishing machine with reciprocating hydraulic table and vertical two roll head.

A HILL Polishing Machine of *YOUR OWN* will afford you important savings...

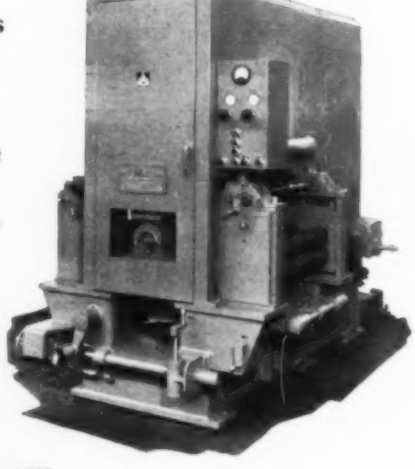
- *By eliminating mill extras.*
- *By proper finishing and prepolishing before forming.*
- *By enabling you to prepare the correct surface finish to meet each individual job need.*



IT'S MOSTLY IN THE HEAD

Two rolls accurately controlled for speeds and pressures with easy adjustment for proper tension of the endless abrasive belt. For fine finishing of all types of ferrous and non-ferrous metals.

● HILL polishing machines are now saving important percentages for manufacturers supplying the dairy and sanitation fields, for automobile bumpers, engravers plates and a wide variety of other industries.



HILL Pinch Roll type with vertical two roll head for polishing strip. Can be used singly or in multiple units for line production.

HILL ACME TOOLS FOR INDUSTRY

The HILL ACME Company

1207 W. 65th STREET • CLEVELAND 2, OHIO

"HILL" GRINDING & POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING THREADING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES

. . . wherever abrasive operations are performed

EDITOR'S PAGE

WHY PAY MORE?

Almost all of us are price conscious. We are price conscious at home and at work. In fact at work it is an important function of the job. The question is, are you treating prices as just figures or are you taking all the facts into consideration?

Almost all the products sold in the metalworking field are sold on a competitive basis. It, therefore, stands to reason that if a quotation or price list is either higher or lower than the rest there is a very important reason. It could be a simple error in the quotation and this should be checked first. It could also be due to higher overhead or labor costs, however, this is doubtful as a builder in this situation will not be competitive for too long.

The most important points to look for on the quotations or price lists which vary from the norm are quality and deletion of features necessary for economical operation. You may pay less initially but, the additional costs of set-up, maintenance and downtime will add up to more than the other quotations. So why pay more?

A situation which covers the point we wish to make has just recently come to our attention. In this instance a company was performing a flat polishing operation. They had need for revulcanizing of their contact rolls and had requested prices from various firms. Several of the firms were lower than the rest and this company took one of the lower quotations. After all it is simply vulcanizing a contact roll. Upon using the roll they noticed chatter marks and soon the bearings supporting the roll were worn. This company contacted the manufacturer of the machine for an explanation and service on their machine. This put the builder in the difficult position of explaining that the rolls which they had vulcanized so cheaply were not balanced and did not run true to centers.

A little investigation by this company on why there was a difference in the prices could have saved them time and money. Whether it is repair parts or capital equipment investigate and evaluate the reasons for price difference. Why pay more?

M. M. Patterson

MANAGING EDITOR

OCTOBER, 1958

A Study of Electrically A

- ✓ *The two types studied are the Electro-Assist and Electrolytic.*
- ✓ *Metal bonded diamond wheels will grind successfully but wheels developed for each have a definite advantage.*
- ✓ *Coolant contamination does affect the efficiency of stock removal.*

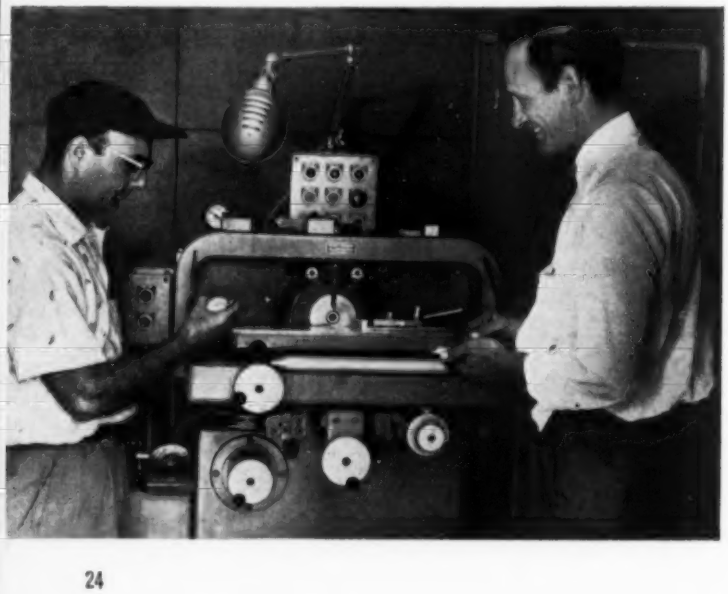
By **M. M. Patterson**
Managing Editor

• The A. I. T. Diamond Tool Company, Skokie, Illinois, in order to develop their diamond wheels for use with electrically aided grinding equipment, have purchased and conducted tests on two of the most successful types of controls. The two types, Electro-assist and Electrolytic, were first tried out to determine the best operating procedure for each. This approach revealed a great deal of very good basic information on use of this method of grinding. Their second step was to test wheels of various types to determine the necessary design and material changes needed to produce a wheel which is most suitable for electrically aided grinding. The tests at A. I. T. indicate that, though any metal bond diamond wheel will work on these machines, there is a definite advantage to using a wheel developed for each type of equipment.

Some of the reasons for the success of this new type grinding of tungsten carbide are as follows: no change in grinding procedure, grinder and diamond wheel can be used conventionally, little operator training, applicable to almost any grinding where coolant can be applied and cost low enough to enable both large and small shops to convert their machines. During the pre-test period these reasons were developed in the field from users of the equipment, and they in turn prompted A. I. T. to use their research department for the tests. The units used were a Wendt-Sonis Econo-Grind Unit (electro-assist), a 300 amp Ano-Cut Electrolytic Unit and a new Hammond SCE-6 fully automatic grinder.

In order to obtain the most accurate results from their tests, it was very important that A. I. T. first determine the most efficient operating procedure for a wheel for each type of equipment. It was found that on the Electrolytic Unit the meter readings for the best wheel is 7-½ volts and approximately 250 to 270 amps. while the Electro-Assist Unit operated best at 5 volts and approximately 70-90 amps, grinding grade 350 ½x½" square carbide. The coolants used were those recommended for each machine. These were contained in a 2½ gallon tank which was changed for each test. The pneumatic feed pressure was 50 pounds automatically set on the Hammond grinder, with 70 oscillations per minute. This removed the possibility of variation caused by off-hand grinding. Each diamond wheel was pre-run to reach peak performance before the testing was started. After the test was started on a wheel, it was neither dressed nor deplated.

The important controlling factors were found to be the unit dial settings for various sizes and grades of carbides, coolant contamination or incorrect mixing



Extensive tests were conducted at A.I.T. on forty diamond wheels. I. Stern and S. Youman are shown conducting the controlled tests.

yAided Grinding

No change in standard grinding procedure.
Little operator training.
Grinding machine and diamond wheel can still be used conventionally.
Care must be taken for wheel alignment when installing new wheel.

of the coolant, and the grit size, conductivity, body design, and bond of the diamond wheel. A. I. T. also found that the following procedure produced much better results from the two types of equipment.

Wheels

The wheels used must be of metal bond with an all metal back to carry the current to the diamond bond. It is important that the conductivity of the back and bond be as close as possible. D6WHC type wheels are sometimes desired, with indicating set screws which are usually found in the same circle as the bolt holes.

Wheel Alignment

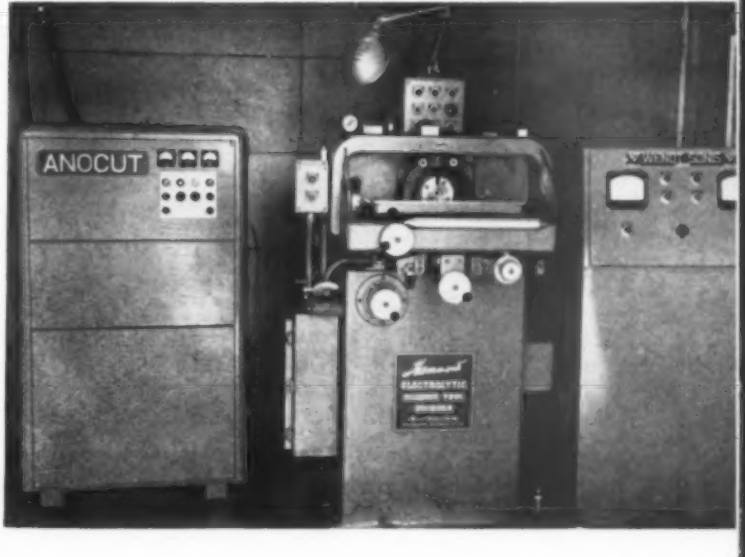
When installing a new wheel for either type machine, care must be taken to indicate the face or periphery to .0005". If the wheel is running out, the change in spark gap will cause a recess in the lower section of the wheel. This condition will continue to get worse if not corrected. Use of indicators will assure higher and longer production between dressing or wheel cleaning.

Deplating

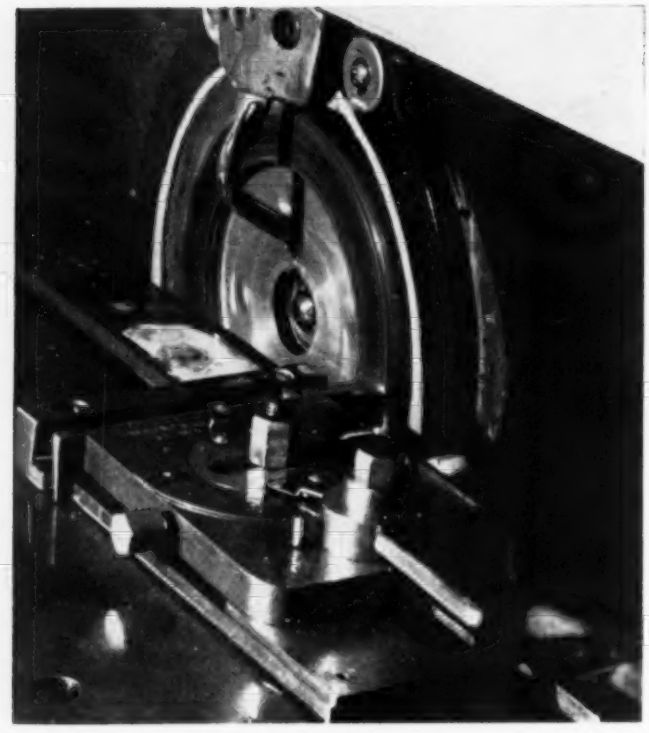
On the Electrolytic unit, when it is impossible to indicate the wheel within the necessary tolerance, the wheel can be trued by deplating. This is done by switching the plus and minus cables on the side of the unit. You will note a key on the front of the unit which is for deplating. This should be turned to deplating after switching the cables. Either carbide or copper should be used in contact with the bond in normal grinding manner. Turn the voltage dial to zero and the spark suppressor dial to 100. After placing feed pressure on the material turn both dials slowly to a twelve o'clock position. An amperage of 70-100 should be drawn during deplating. A 45 second period is usually sufficient to obtain the desired results, depending on the condition of the wheel. Deplating removes the bond from the diamonds, increasing the gap between the work and the bond and allowing freer cutting action of the wheel. After deplating, be sure to turn the key back to the grinding position and reverse the cables. Peak performance of the wheel will be gradually reached during the following operation. This period will be 10 to 20 minutes. On the Electro-Assist unit, the diamond wheel does not require deplating for high performance.

Dressing

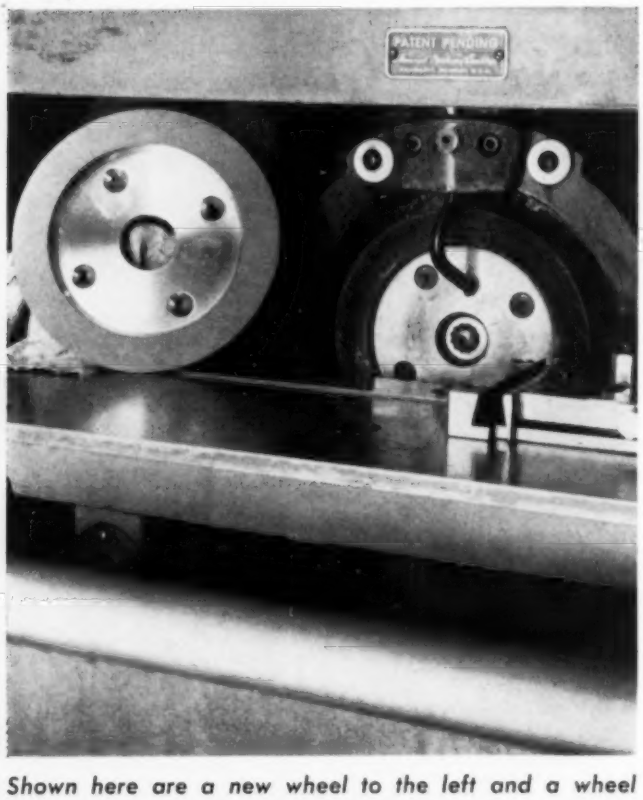
Dressing sticks can be used to clean up the face of wheels on the Electro-Assist units and increase the



In order to obtain the test results A.I.T. purchased the units shown here. They are the Anocut 300 amp Electrolytic Unit, Hammond SCE-6 fully automatic grinder and a Wendt-Sonis Econo-Grind Unit.



The sparking shown here and on the cover is not the correct way for this type grinding. The best results are obtained by using 7½ volts on one of the units and 5 volts on the other.



Shown here are a new wheel to the left and a wheel which has been properly broken in mounted on the spindle. Note the dark color of the broken in wheel.

Electrically Aided Grinding

(Continued)

cutting action of the wheel. (The diamond gap for fast cutting action is different for the two units and maintenance for each should differ.)

Breaking In The Wheel

When placing the new wheel on either unit, feed pressure should be light until the wheel has been broken in. Too much pressure on a new wheel will cause arcing, wear and unnecessary maintenance. All the E-2 and EA-2 wheels developed by A. I. T. for these units are pre-run for normal operating pressures before shipping.

Coolant

The recommended coolants should always be used for each of the units. When these coolants do not cover the full face of periphery of the diamond section, the stock removal is slow. If you are uncertain about the wheel receiving enough coolant, move the coolant hose to the face above the work. If this increases the amperage and stock removal, make the necessary adjustments and grind in this manner.

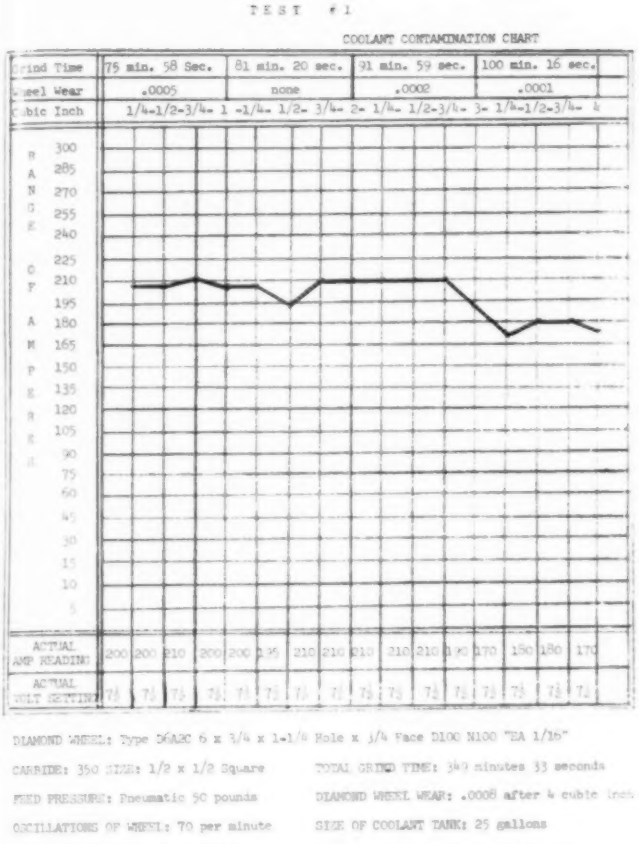
In off-hand grinding the hose should be directed to the center of the wheel, just above the hole. In D1T grinding the position should be at 5 o'clock or 7 o'clock depending on the rotation of the wheel.

The wheels on both the units will have a different appearance after use. On the Electrolytic, a velvet black or charcoal surface will indicate that the wheel is working properly. On the Electro-Assist unit, the wheel will have a clean metallic look. If the wheel on either unit has a shiny appearance, it has a deposit of flash and burned metal clinging to the bond, which can be removed by dressing if the condition has not existed too long.

On off-hand grinding, the work or wheel should be oscillated. Care should be taken not to exceed 1/8 of an inch of the work off the diamond section on either side. If the work does exceed ⅛ of an inch, the corner of the wheel will fire, and cause fast deterioration of the edge of the wheel. Lowering and raising the amps will result in an uneven grinding.

When grinding, it will be noticed that more stock will be removed when more pressure is placed on the diamond wheel. Pressure should be even and enough should be used to produce satisfactory stock removal. The unit can be adjusted high enough to allow the operator to use minimum pressure. The above precautionary measures, if followed, will definitely result in the lowest cost possible in grinding carbide.

The new diamond wheels, E-2, for Electrolytic, and EA-2, for Electro-Assist, which have been the results of many hours of research, are now being offered to

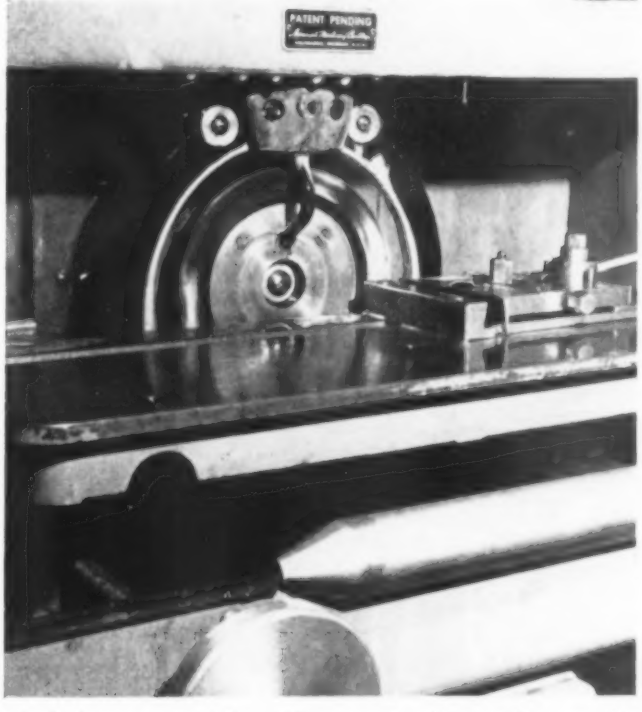

TEST #1
COOLANT CONTAMINATION CHART
Grind Time
75 min. 58 Sec.
81 min. 20 sec.
91 min. 59 sec.
100 min. 16 sec.
Wheel Wear
.0005
none
.0002
.0001
Cubic Inch
1/4-1/2-3/4- 1 -1/4- 1/2- 3/4- 2- 1/4- 1/2-3/4- 3- 1/4-1/2-3/4- 4
RANGE
OF
AMPERAGE
ACTUAL AMP READING
ACTUAL VOLT SETTING
DIAMOND WHEEL: Type 26A3C 6 x 3/4 x 1-1/4 Hole x 3/4 Face D100 N100 "EA 1/16"
CARRIER: 350 SIZE: 1/2 x 1/2 Square
TOTAL GRIND TIME: 349 minutes 33 seconds
FEED PRESSURE: Pneumatic 50 pounds
DIAMOND WHEEL WEAR: .0008 after 4 cubic inch
OSCILLATIONS OF WHEEL: 70 per minute
SIZE OF COOLANT TANK: 25 gallons

Diagrams showing the necessity for larger coolant tanks. The fact that the coolant on an electrically controlled grinder is of importance can easily be seen when smaller tanks are used. The above charts showed that the Test No. 2 made with a 2½ gallon tank was quickly contaminated through constant use. Test No. 1 made with the 25 gallon tank showed an even level of production through the full 4 cubic inches of removal. It will be noticed that all other factors were alike through both tests.

users of both electrolytic and electro-assist units. In every case where these wheels have been tested to date, the facts in this article were definitely proven. The three pieces which included Electrolytic and Electro-Assist and the Hammond SCE-6 Grinder, are now on display for visitors. Visitors will be able to see for themselves how a diamond wheel manufactured for these methods will actually do their tool grinding for their own applications at a more satisfactory rate.

Many installations of electronic units have been made for tool and cutter applications. New wheel designs are becoming necessary for these applications. The success of these new installations will require both the engineering assistance of a diamond wheel engineer and the cooperation of the user. The Econo-Grind unit incorporates a coolant tank and pump unit along with its electronic works. This development will encourage new fields for these units.

The Econo-Grind which will be demonstrated along with the Electrolytic Unit to all visitors is the only unit of its kind on display throughout the midwest. To see these machines on actual grinding practices, reservations at least seven days in advance are necessary. In addition, a complete schooling program is offered by A. I. T. on both units for all companies who desire to send operators for an eight hour demonstration. During this demonstration the visiting operator will note the problems on these units and how to correct them. • • •



Deplating usually takes 45 seconds after setting up the Anocut unit for deplating. An amperage of between 70 and 100 should be reached during deplating.

The Shape of Wheels to Come

- √ *Bonds with lower coefficient of expansion.*
- √ *Elimination of "fishtailing".*
- √ *Development of a "dry lubricant".*
- √ *Controlled orientation of crystals in the wheel.*
- √ *Uniform bond hardness.*
- √ *Permanent wheel identification.*

By **James Meehan**
Director of Grinding Machines Sales
Brown & Sharpe Mfg. Co.

● Grinding as a process goes back approximately a century, depending mostly on when one dates the invention of the first emery wheels. The grinding wheel as we know it today, however, became a real metal removing tool with the discovery of silicon carbide by E. G. Acheson in the late nineteenth century.

The development of grinding wheel applications has been limited at times by what the wheel could produce, at times by the machine, and in other instances by what the work piece would stand. This has been a continuing contest. It seems likely to continue into the foreseeable future.

Always it has involved better, faster cutting wheels, higher production rates through automatic cycles and machine requirements, combined with demands for closer limits.

In the 1930's, this led to single wheels up to 10" wide and 30" in diameter, requiring up to 50 horsepower, which challenged lathes in metal removing ability. The late 1930's and early 1940's saw the introduction of the profilometer and the brush surface analyzer, which measure surface finish in microinches rms, readily understood by all concerned.

During the World War II period production limits of plus or minus 0.0002" became more common, and today limits of half that amount are considered quite general on finish precision ground parts. Then, in the early part of 1948, we received an inquiry concerning the grinding of fuel injector plungers for diesel engines. The specifications stated that the parts must be ground round within 0.000010", straight within 0.000012", and to a specific size within plus or minus 0.000020", with a surface finish not to exceed two micro-inches rms. When we found out that this was no mistake, as we had first thought, the assault on millionths began.

Since 1948 a fairly large number of plain grinding machines have been sold on which specially trained grinding machine operators can produce work to plus or minus 0.000020". Recently we have offered a plain grinding machine, refined and with instrumentation on which semi-skilled operators can grind work to millionths.

From this plateau in the development of grinding wheels it is worth while to look ahead to some of the problems for which grinding wheel users are looking to the manufacturers for solutions.

Bonds with a lower coefficient of expansion

Grinding wheel expansion becomes effective when grinding to such close limits. We understand that grinding wheel expansion is now in the order of 0.000020" per inch per degree Fahrenheit which, when using a 14 inch diameter wheel, becomes quite a

factor in grinding parts to plus or minus 0.000010" and straight within that figure. It would be desirable to have grinding wheels available with a bond of a lower co-efficient of expansion than are presently available. In grinding to such extreme limits of precision the changes of wheel dimensions caused by temperature variations begin to be troublesome. If coolant is applied to a grinding wheel in varying volume across its face when plunge grinding, the temperature of the wheel will vary from one point to another, which, when grinding to close limits varies the work diameter in the same degree, which is also troublesome.

Also, heat from the left spindle bearing is transferred to the right side of the wheel which has the same effect, causing the barberpole surface condition on the work when doing long work with a reciprocating table. A wheel as dimensionally as stable as "invar" alloy would be ideal but, of course, this seems to be very visionary.

Elimination of "fishtailing"

Another problem which exists and will become increasingly important as mechanisms requiring extreme accuracy and surface quality are developed, is the scuffing or scratching which is popularly termed "fishtailing." As far as we can determine, this results from grains breaking free from the grinding wheel and passing through between the grinding wheel and the work. It is believed by some that a fractured grain may make several revolutions before finally breaking away.

This is evident particularly when grinding high chrome steels, highly resistant to abrasion, which are commonly used in punch and die work. To help this "fish-tail" condition we usually employ primary and secondary filters for the coolant. This, of course, prevents loose grains held in suspension in the coolant from re-entering between the wheel and the work, but there still remains the problem of loose grains clinging to the wheel, then breaking free at the point of contact of the wheel and work to gouge the work surface.

Development of a "dry lubricant"

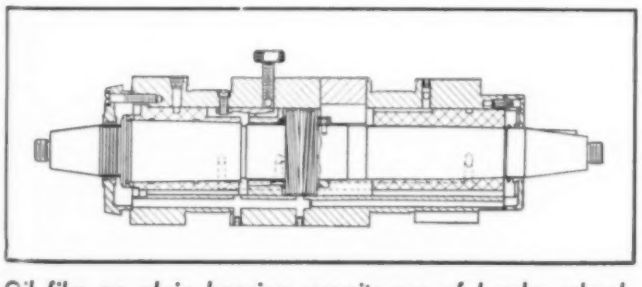
There are many instances where it is necessary that grinding be done dry, in spite of the fact that it is generally desirable to grind hard work with coolant. On occasion it is objectionable to apply coolant to the wheel in drips or mist, as sometimes recommended. Troublesome factors in dry grinding of hard work are the re-welding of hot chips to the surface of the work, and quick loading of wheels, which calls for frequent wheel dressing. We would like to suggest the development of a "dry lubricant" such as molybdenum disulfate or graphite to practically fill the pores of the wheel.

Controlled orientation of crystals in the wheel

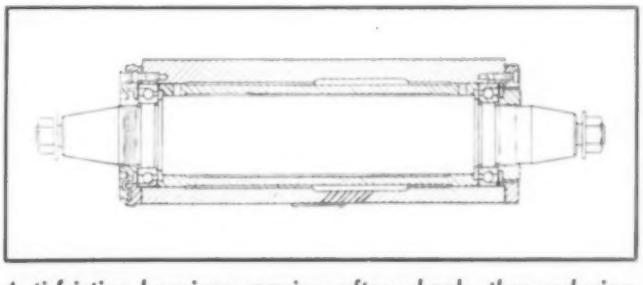
Cool cutting wheels have been developed in recent years, but they are still far from ideal. If the shape of the abrasive and the orientation of the crystals in the wheel could be controlled in such a manner that the angle of the abrasive would be less negative (I would like to say positive), a cool, free cutting wheel would result. This, of course, is a big order. We are sorry we cannot even suggest a way by which this can be accomplished.

Harder wheels for pre-loaded anti-friction bearings

It is a recognized fact that grinding wheel spindles mounted on preloaded anti-friction bearings use wheels of a softer grade than spindles mounted on oil lubricated plain bearings, when grinding the same material. The conflict of higher surface finishes with extremely close limits, hard materials, and the desire for rapid spark-out is conducive to the use of pre-loaded anti-friction bearing spindles or solid plain bearing spindles with small oil space or clearance. Regarding spindle bearing construction, there seems to be a drifting more toward the anti-friction type of bearing, due to the increasing lack of highly skilled mechanics to service and care for plain bearing spindles. The desire to use anti-friction bearing mounted spindles and softer wheels, against the oil lubricated plain bearing spindle with a harder wheel is rather a difficult choice. The oil film of the plain bearing spindle provides a dampening effect which permits the use of harder wheels, and they contribute much to self dressing. If a wheel could be developed with a metal core and a ring of non-



Oil film on plain bearing permits use of harder wheel. Forced feed lubrication and seals to exclude air remove principal cause of plain bearing failure.



Anti-friction bearings require softer wheels, thus reducing wheel life. With a non-metallic ring "dampener" between the metal core and the abrasive, harder wheel could be used.

metallic substance to be employed as a dampener between the core and the abrasive wheel it might produce the utopia of gaining all the advantages of an anti-friction bearing spindle with the advantages of an oil lubricated plain bearing spindle.

Uniform bond hardness

As far back as the early 1930's we were crush grinding skirt fins in aircraft cylinders and now, as then, we believe we can detect an uneven hardness around the periphery of wheels when crush grinding. It appears there is always enough variation in friability of the bond so that the wheel runs out slightly after crush dressing, giving rise to a pronounced revolution wheel mark on the work. There seems to be an area for improvement in uniform bond hardness of wheels.

Additional conductive bonds for electrolytic grinding

There is an increasing use of the electrolytic grinding process. We regret that at present we cannot buy electrically conductive grinding wheels, except metal bonded diamond wheels. It appears that silicon carbide or aluminum oxide would serve the purpose if a conductive bond could be employed. Such a wheel would be cheap enough to permit dressing to shapes as in form-grinding electrolytically. For this purpose, at present, metal bonded diamond wheels are too expensive to be practical. If the conductive binder were porous so as to permit the application of electrolite through the pores of the wheel, that would be an additional advantage although it is not a "must." Such a wheel would presumably be run at very much lower peripheral speeds than in ordinary grinding.

Permanent wheel identification

Practically all industrial users of grinding wheels has had the experience of wishing to replace a wheel which has proved quite satisfactory for the applied purpose only to discover that the identification of the wheel on the blotter to be obliterated beyond recognition. This, of course, usually occurs when a wheel has been used for wet grinding. To remedy this, we suggest either providing a plastic or some similar coating to the blotter on the side of the wheel which would not be contaminated or obliterated by the coolant, or possibly, impregnating the identification of the wheel in the structure of the wheel itself.

I have related some of our present problems in which grinding wheels play an important part. New scientific developments which are going on apace are creating needs for new materials, and bringing into focus what but yesterday were considered imaginary grinding requirements. We as grinding machine builders and users look to the grinding wheel makers for help. • • •

IN PROCESS . . . FOR FUTURE ISSUES OF GRINDING AND FINISHING

Grinding at Ford-Lima

A round-up on abrasive applications at the new Ford plant at Lima, Ohio . . .

The Art of Tool Sharpening

The know-how of one of the country's most experienced grinding engineers, condensed into a readable, well-illustrated picture feature . . .

Using Coated Abrasives Safely

An authoritative treatment of the safety problems which are most important in the use of coated abrasives . . .

Abrasive Grain for Blasting

Complete and thorough coverage of the use of abrasive grain for blasting . . .

Better Diamond Dressing for Precision Grinding

Results of extensive tests on diamond dressing, which should be of interest to many users of diamond dressers . . .

Grinding Zirconium

Problems and their solutions in the grinding of this atomic age metal . . .

All of these and many other articles are part of the planned editorial program of GRINDING and FINISHING, to provide our readers with material on all phases of the broad field of abrasive operations, including grinding machines of all types, accessories and all kinds of abrasives—grinding wheels and other bonded abrasives, belts and other coated abrasives, and abrasive grain.

Cutting A Star

Meteorites after they have been found must be cut to permit examination of the cross section. Due to the hardness and the need to save as much of the material as possible many of the meteorites can only be cut by an abrasive compound on a sheet steel disc.

By **R. N. Perry, Jr.**
Norton Company

• The popular song about catching a falling star is pleasant to listen to even if the message in the lyrics isn't very practical. A falling star, or more correctly a meteorite, would be dangerous to catch, even if you could. Meteorites are particles of matter which strike the earth after journeys through outer space at speeds estimated to be as high as 45 miles per second. They begin to burn up because of the heat of friction when they enter the earth's atmosphere. Ablation is the technical term for the loss of material during this burning-up process. Large meteorites strike the earth with greater velocities than small ones so that the rate of ablation is higher for the larger ones. However, the size of a meteorite before entering the atmosphere cannot yet be estimated reliably from its final size on the earth.

The people at the Smithsonian Astrophysical Observatory in Cambridge, Massachusetts, would like to catch a falling star. Their more practical wish is to find someday a photographic record by a meteor tracking camera of a blazing meteorite fall. Dr. Fred L. Whipple, Director of the Smithsonian Astrophysical Observatory and Professor of Astronomy at Harvard University, directs an extensive program to photograph the trails of meteors. Meteorites are far less common than meteors which can be seen on many clear nights.

Dr. John S. Rinehart, Assistant Director of the Observatory, heads a project studying meteorites so that man may know more about his own planet. Meteorites, according to a present theory, may be parts of small planets called protoplanets which once had orbits between those of Mars and Jupiter. Some forces, perhaps a collision, caused them to break up. Some pieces which have been found are completely metallic. Others may resemble ordinary rock to the untrained observer.

Dr. F. Behn Riggs, Jr., is one of the research team of the Observatory who is directly concerned with the analysis of meteorites. His work is done at the Gordon McKay Laboratory of Harvard University where the most modern scientific equipment is available.

Beginning with the meteorite as it is found in the field, he first cuts it to permit examination of the cross section. The most common constituent of the metallic

The first step in studying a meteorite is cutting it to obtain a cross section. At the Smithsonian Astrophysical Observatory project in Cambridge, meteorites which are too tough for a band saw are cut with a galvanized steel disc and loose abrasive. The cutting medium consists of 90% silicon carbide and 10% Norbide boron carbide (both 240 grit) suspended in a mixture of grease and oil. The disc rotates at 120 r.p.m.

Deburring and Cleaning
8 TIMES FASTER — and Better
by Liquid Honing with EXOLON FASTBLAST

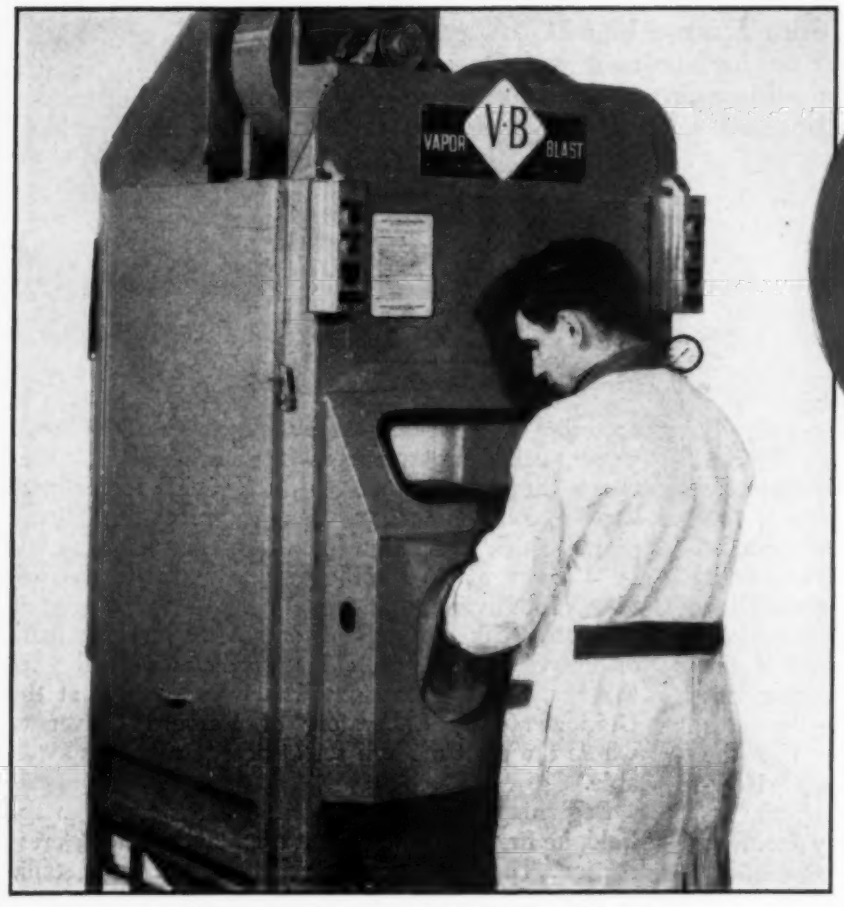
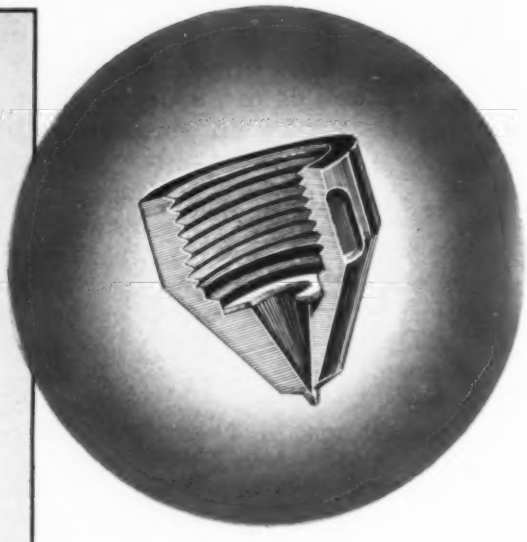


Photo courtesy Vapor Blast Mfg. Co., Milwaukee, Wisconsin.



The almost microscopic holes in this Diesel fuel injector cup were deburred and cleaned by Liquid Honing with EXOLON FASTBLAST. And, best of all, it produced a smooth surface that promoted better fuel flow and cut down gum deposits — all at a saving of 87.5% over conventional methods.

If you have a finishing operation, let our technical and research staff estimate your savings by changing to this profit making method! Mail coupon below for fast service!

Liquid Honing is a method using EXOLON FASTBLAST (aluminum oxide) abrasive in particles so small they can be suspended in a slurry and thrown at high speed against the work to be finished. Scales, burrs, carbons, oxides are quickly removed — in fact one man and one machine equalled the former production of eight men using conventional methods in the deburring and cleaning of the Diesel fuel injector cup illustrated.

The rate of finish is controlled by varying the air pressure, abrasive size, type and concentration, blast angle and distance of nozzle from the work. The abrasive mesh sizes are usually 80, 100, 150, 180, 220, 240, 320, 400 and 600.

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We are interested in saving money on our finishing.

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- ☐ Send us information on EXOLON FASTBLAST.
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Manufacturers of SILICON CARBIDE *and* ALUMINUM OXIDE ABRASIVES

meteorites is iron. Some can be readily cut with a metal cutting bandsaw. Because of hard materials which frequently are included, others must be cut with abrasives.

When abrasives are used, the specimen is usually cut by means of a sheet steel disc to which fine silicon carbide abrasive in a suitable vehicle is applied by hand. The disc is mounted on a spindle held in a drill press, operating at about 120 r.p.m. The meteorite is held in a matrix of plaster of Paris.

One meteorite examined recently resisted even the abrasive cutting action of silicon carbide. A Norton Company engineer suggested using a mixture of Norbide boron carbide and silicon carbide. The addition of about 10% boron carbide (one of the hardest abrasives known) solved the problem. The abrasives were added to a mixture of grease and oil to form a cutting medium of the proper consistency. Cutting time was about four hours . . . slow perhaps by commercial standards, but purposely slow to avoid bending the thin saw disc with too much force between the disc and the work. A thicker saw would waste too much of the valuable specimen. After a few billion years, what's four hours to a meteorite!

Once the meteorite is cut, Dr. Riggs prepares the cut surface in the manner of any metallurgical sample. The surface is ground smooth and flat by hand on a series of progressively finer strips of coated abrasive paper. Finally it is polished with diamond-paste on a fabric covered lap.

Etching in acid brings out the locked-in secrets which can be seen with the aid of the microscope. Iron meteorites vary in the amount of nickel they contain. Even minute crystals of diamonds have been found in them.

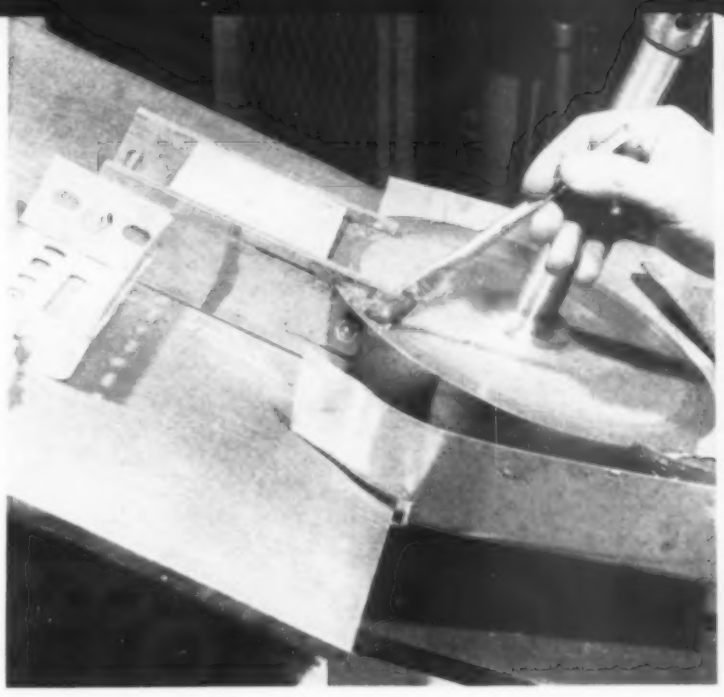
In the light of present accomplishments in making diamonds, scientists have some understanding of the tremendous pressures to which at least these meteorites probably have been subjected some time, somewhere in space.

The hard-to-cut sample was found to contain a material tentatively identified as cohenite or iron carbide.

Some minerals found in meteorites are not known on earth. Some of these minerals react with our moist air so that they would not be expected in the earth's crust. Of course some earthly minerals which are the result of weathering are not expected in meteorites.

Dr. Riggs is now working on X-ray equipment which will make possible further study of the distribution of elements in meteorites. A thorough metallurgical study of meteorites may help us understand the effects of high speed flight of objects through the atmosphere.

There was a time when men like Dr. Rinehart and Dr. Riggs were considered dreamers because they sought knowledge of things that seemed to have no practical value. People once laughed at men who talked of smashing atoms and firing rockets. Today, as we see bits of information gathered painstakingly by dedicated scientists forming an over-all picture of scientific achievement which the layman can comprehend, we see that these men are the true pioneers of our age. • • •



The meteorite being cut is embedded in the block of plaster of Paris clamped in the holder. The weight of the work, acting about a pivot, bears against the saw because of the 30° incline on the table. With this light pressure, about four hours are required to cut through the meteorite. The pivot arrangement prevents chatter. A small force between the disc and the meteorite is desirable to avoid warped saw cuts resulting from bending the disc.

Mrs. Lynne Farrell, a physical science aide in metallurgy, examines the cross section of a meteorite as part of a research project carried on by the Smithsonian Astrophysical Observatory. After the cut surface was polished and etched in the same manner as normal metallurgical samples, the microscope revealed the presence of nickel and iron carbide. The average hardness of the iron carbide, as determined by the hardness tester, was about 1000 Knoop with a 100 gram load.

How Claude Phillips helped

More than ten years experience as a welding specialist gave Claude Phillips a sound basic knowledge of metallurgy and grinding methods. In the years since World War II, he has expanded that knowledge into an expert's familiarity with all types of grinding techniques. It is this wide yet concentrated experience that makes him so outstandingly useful to his customers.

...cut stainless steel weld-grinding costs

There's nothing delicate about stainless steel until you overheat it. Then you've got a problem... because excessive heat breaks down the chemical structure of the metal and reduces its resistance to corrosion.

Nobody is more conscious of this than Plant Manager John Luker of Gaston County Dyeing Machine Co., Stanley, N. C., and the man who helped him solve the problem... Claude Phillips of Bay State distributor Southern Oxygen Company.

Knowing the job that Bay State Blue Flash R grade wheels had been doing for others, Phillips persuaded Luker and Purchasing Agent James Stroup to try them. They not only cut cool... comfortably below the 670°F critical limit of stainless... they gave him a higher rate of stock removal than any other wheel on the market. As a result, more work is produced per payroll dollar and there are neither hot spots nor weak spots in Gaston County Dyeing machines.

Like Claude Phillips, your own Bay State distributor is an experienced specialist in grinding problems. Cost-cutting ideas he develops for others may be unexpectedly useful to you, too. Why not get in touch with him and see what he can do? *Better grinding at lower cost—that is his business.*

Operator uses 9" x 1/8" Blue Flash R grade raised hub disc wheel to blend pressure tank of T-316 stainless. This wheel generates minimum heat yet gives extremely high rate of stock removal.

BAY STATE WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
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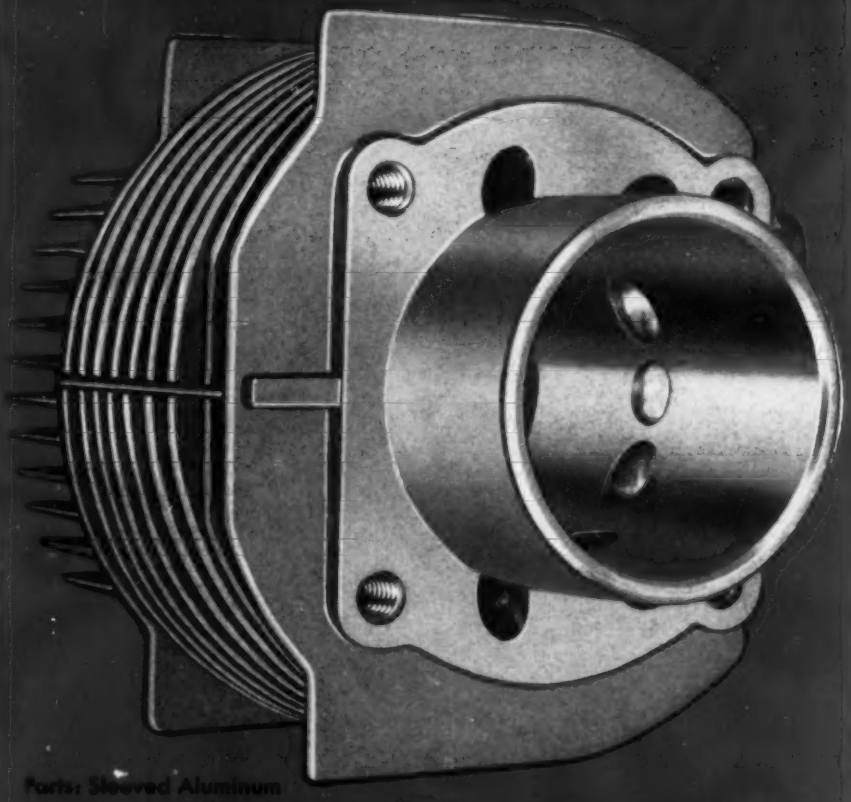

Parts: Sleeved Aluminum Cylinders
Two Models: 1 1⁵⁄₁₆" and 2⅛" Dia.

Sunnen MBB-1290-D Precision Honing Machine
Standard tooling range covers ⅛" to 2⅝" Dia.

At Lawn Boy one Sunnen Honing Machine keeps pace with a double-spindle boring machine and finishes 150,000 cylinders per year.

During the past four years, this Honing Machine has turned out over half a million of these high precision cylinder bores . . . all to very close tolerances . . . with the exact specified surface finish.

Your sizing or finishing problems may differ from this example, but if you do internal diameter work it will pay you to investigate the accuracy, speed and cost-saving features of Sunnen Honing. Mail us a print, sketch or sample part for free producton estimate.

Sunnen Honing saves twice: Small initial investment and low-cost-per-piece. Average installation with tooling runs about $1,000.

Write today for new Brochure No. 5075 showing production rates on 99 case histories.

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Canadian Factory: Chatham, Ontario

Part II

Control Reduces Tool Grinding Costs

By **Jules Caldwell**
Assistant Mechanical Engineer
Indianapolis Works
International Harvester Company
as told to Dick McKee

"What are the men doing out there?"

"Grinding tools."

"What kinds of tools? How many of each type? How long does it take to grind them?"

Such casual questions from a production foreman placed in temporary charge of the tool-grinding department about five years ago have led to a rather detailed analysis of the use of time, and consequent cost, for which the forms are shown in Figures 3, 4, and 5. Only the last one, (Figure 5), is now in use. The others are included to show how the thinking developed, starting near the end of 1953. For clarity in presentation, the forms have been somewhat abbreviated, but enough has been retained to show the basic idea of each.

Until late 1953, the Indianapolis Works tool grinding department, like so many others, "ground tools." Now it is safe to say that they may accurately figure what it costs in direct labor to grind any tool in the plant. It can be argued that this is not a true cost, and from a strict accounting viewpoint this may be true, since such items as salaries, equipment depreciation and other overhead items, are not taken into account. But as was pointed out earlier, this program is essentially one of control by the foreman. It has been felt that the overhead items are relatively constant, and can be added in if such an adjustment becomes necessary. They are not, however, within the responsibility of the foreman, for one thing, nor are they really necessary for him to control his operation.

The original form, (Figure 3), is a simple record of production, number of employees, and the hours worked on various accounts. It will be noted that production (Column 2) is subdivided by type

TOOL GRINDING DEPARTMENT

TIME SPENT ON VARIOUS ACCOUNT NUMBERS

USED ACCORDING TO PRODUCTION

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Week Ending	Week Production Silver	Blue	Total Prod.	No. of Employees on Payroll	Reg. 847	Spec. 847	Exp. & Shop Or.	Rework	Vac. & Absent	Notes
7/19/53	400	500	1700	75	2420	19.50	4.50	20.75	335.00	
7/26	1215	504	2473	"	2405	36.25	24.00	1.50	343.40	
8/2	1774	373	2618	"	2311	34.50	10.75	.00	388.00	
8/16	2268	450	3208	"	2427	18.17	17.40	2.25	405.60	
8/30	1600	385	2383	67	2165	36.75	54.00	6.50	317.30	
9/6/53	1779	402	2543	"	2172	139.25	20.00	19.50	221.07	

Figure 3

TOOL GRINDING DEPARTMENT

TIME SPENT WEEKLY AS STATED ON VARIOUS ACCOUNT NUMBERS

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Week Ending	Weekly Production Est.	Act.	No. Emp. on Roll	Avg. Rate per Hour	Actual Cost on 847	Reg. 847	Avg. Tools Grd. per Man	Service Tools Ground	Misc. Jobs	Vac. & Absent	Notes
11/6/55	8,450	7625	66	2.33	5,732	2439	291	792	6.00	85.03	
13	8,850	10,109	66	2.33	6,753	2891	311	911	3.75	11903	
20	9,197	10547	67	2.33	6,785	2911	333	107	3.50	181.75	NEW MAN - BUNDY

Figure 4

of engine and also recorded as a total. There are four subdivisions on the original form, of which two are shown. Another noteworthy point is that vacation and absentee hours are entered, so that the account, in hours, balances with the total of the time cards for the week in the department. Under "Notes," of course, are included any information to explain unusual conditions—a four-day week, for instance. The original contained a total of 18 columns, and was reproduced running the long way of an 8½" x 11" sheet of paper. Each sheet was sufficient for six months of operation.

The intermediate form (Figure 4) is the same size and contained the same number of columns. In one change, production (Column 2) was shown by two figures, estimated and actual, without subdivision. At the Indianapolis Works the accounting system provides a dollar total of direct labor cost for production. The figure is useful here primarily as a base for calculating a ratio of tool grind direct labor cost to the direct labor cost of production. Other additions were the inclusion of an average rate per hour and of actual cost on account No. 847, the account to which tools ground for production are charged. The figure was calculated by multiplying the number of hours worked on the account by the average rate per hour. Other modifications included a column for average tools ground per man (Column 7) and the number of service tools ground (Column 8).

In the current form (Figure 5), the major change is the inclusion of columns for a breakdown of the account No. 847. There are six subdivisions on the form, of which only one (Column 7) is shown for illustration. Again the record is in the form of hours charged against various accounts, and the conversion to money is made by multiplying hours by average rate. To accommodate the additional information, the form had to be changed to an 11" x 17" sheet and bound in a post binder.

TOOL GRINDING DEPARTMENT

TIME SPENT WEEKLY ON VARIOUS ACCOUNT NUMBERS USED

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Week Ending	Weekly Production Est.	Act.	No. Emp. on Roll	Avg. Rate per Hour	Actual Cost on 847	Total Hours Used on 847	Dept. 55 Acct. 847-01	Avg. Tools Grd. per Man	Service Tools Ground	Misc. Items	Vac. & Absent
3/30/58	6114	5738	54	2.66	3876	1454.25	1.50	296	562	5.50	
4/6/58	6132	5674	54	2.65	4047	1526.90	.00	293	941	3.75	
13	6171	5752	54	2.64	4004	1515.75	.50	310	1127	4.50	

Figure 5

TRIAL TOOL PERFORMANCE RECORD

Indpls WORKS TEST NO. 3342

DESCRIPTION 7" X ½" X 1½"
1A-542-H21-V40

VENDOR _____ TOOL NO. _____

REG. SUPPLY Robertson NO. IN TEST 27

NAME OF PART Gear Hobs PART NO. _____

TYPE OF MATERIAL H.S.S. COOLANT yes

HARDNESS SPEC. _____ OPER. NO. _____

OPER. NAME F. KOCH

MACHINE NAME Barber-Colman MACHINE NO. _____

SERIAL NO. 188 SIZE _____ GRIT _____

R.P.M. 3440 S.F. _____ F.P.M. _____ F.P.R. _____

FEED VARIOUS DEPTH OF CUT VARIOUS

DATE 3-26-58 COMPLETED 5-3-58

REMARKS: These wheels were used and found to be very Good. We averaged (24) hobs re-sharpened per wheel against our regular wheel, of which we average (15) hobs per wheel.

SIGNED BY Paul Flick 5/15/58

We will re-order (50) pcs. for a final check, before we set this wheel up as a stock item.

Figure 6

Trial Tool Performance Record

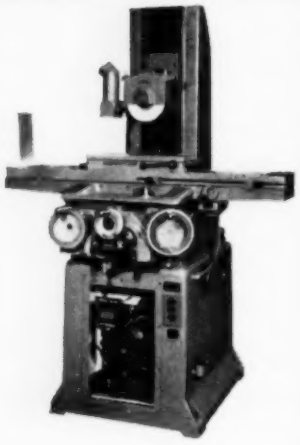
Another significant part of the tool grinding cost program at IH's Indianapolis Works is the Trial Tool Performance Record (Figure 6). This originates in the office of the perishable tool research engineer, and is completed by the tool grinding department. All purchases of grinding wheels and other perishable tools are made on the basis of the test results.

As a plant policy, at least two sources of supply are carried for each type of grinding wheel used. However, if another company appears to have a better product than one in use, a trial order is issued. When the wheels are received, a Trial Tool Performance Record is made out in duplicate. The number of wheels tested depends on the application.

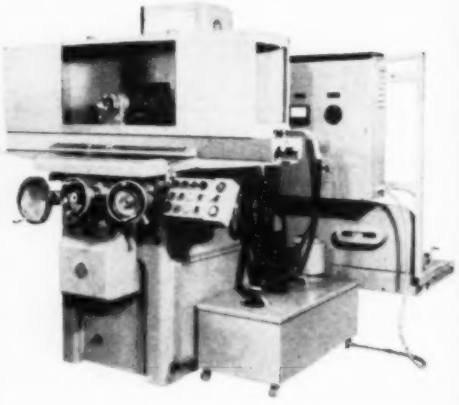
For the test, the grinding operators keep a record of the performance of the wheels, noting the material ground, the tool number or numbers, the time involved for each run and any other observations that seem applicable. The test boils down to a grinding cost per tool, determined by adding wheel cost and labor cost, and dividing their sum by the number of tools ground. If the new wheels appear to be better than the old, the regular vendors are notified of the results, and are given a chance to submit improved wheels for test. However, if further check tests show that the new wheels are still better, instructions are issued to change vendors, and the test results are circulated to other IH plants.

Conclusion

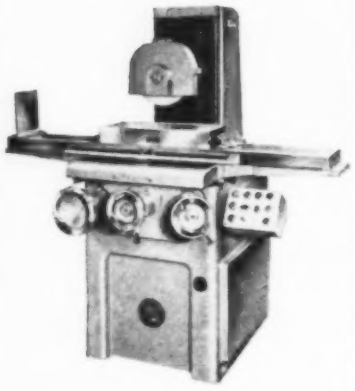
The installation and administration of a system such as this brings with it a number of problems, not the least of which is the education of production supervision to the new methods of doing things. In the opinion of the management at Indianapolis Works, International Harvester Company, the results far outweigh any disadvantages. • • •



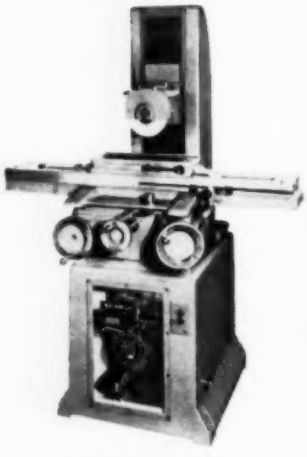
REID Model 618 P
Power Table Power Crossfeed



REID Germanium slicing machine

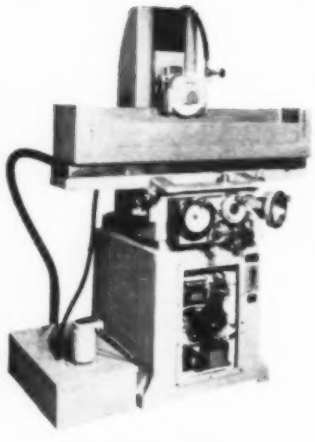


REID-O-MATIC 824
All Electric Production and Toolroom precision surface grinder



REID Model 618 H
Hand operated (Table and Crossfeed)

REID Electrolytic surface grinder



REID Model 618 PT
(Power Table Hand Crossfeed shown with wet grinding attachment)

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MATTISON HIGH-POWERED PRECISION GRINDING METHODS

Self-dressing wheels and high-powered surface grinders eliminate inefficiencies when machining flat surfaces!

EXAMPLE: 4140 steel forgings, formerly milled at 33 per hour, are now ground on a Mattison No. 24 Vertical Rotary Surface Grinder at 58.6 per hour. Tool replacement cost has been reduced from 39¢ per piece to 4¢. Total part cost was cut from 54¢ per piece to 11¢. Automatic sizing and self-dressing wheel help minimize nonproductive machine time.

When you have flat surfaces to machine, let Mattison evaluate cost reductions and accuracy improvements made possible by high-powered surface grinding.

With recent improvements in grinding wheels—and Mattison has backed them up with increased horsepower at the spindle and plenty of machine rigidity—many jobs which were formerly machined by other methods are being done more efficiently on a surface grinder. For, modern grinding methods permit you to remove up to ¼-in. stock from the rough, with accurate size control and fine finish, holding flatness and parallelism within very close limits.

Cost of the cutting tool is not in the price

By using open-structure wheels which automatically release their grits when they get dull, and with automatic sizing to compensate for wheel wear, you get true perishable tool efficiency. A glance at the table below will show you how reductions in tool-sharpening cost and change time helped trim 43¢ off the cost of forged chain links. Whatever the cost of the wheel, you can afford to use it at maximum efficiency. You never have to "baby" the cutting tool by slowing down your machines. There's no worry about hard spots. You can grind before or after heat-treating.

How to absorb loading time into the production cycle

Many flat surfaces on castings and machine parts can be rough and/or finish-ground on a standard surface grinder at 100 per cent efficiency.

Whenever machining time and loading time are equal, you can absorb loading cost into the production cycle with a duplex table. Using self-dressing wheels and automatic sizing, the Mattison Duplex Rotary gives you remarkable efficiency on a standard machine, plus all of the rigidity needed for high stock removal and generation of accurate surfaces with the wheel set "dead flat."

Tolerances getting tighter

Many companies are switching to surface grinders to combine the advantages of rapid stock removal and accurate size control. On thin-walled parts, particularly, you can eliminate distortion while the part is being ground, holding accuracy within "tenths" limits. The torque converter housing (Fig. 1) is a good example. An open section in the casting made it difficult to mill without springing the ends. Now, flatness and parallelism are easily held within .0015 in.

MACHINING COSTS and PRODUCTION RATES (4140 steel forging)

Machine	Milling Machine	Surface Grinder
PRODUCTION RATE Pieces per hour	33	58.6
(1) MACHINING COST Machining time x (labor + overhead) = (min) x ($ per min)	$.13 per piece	$.05 per piece
(2) TOOL OR WHEEL REPLACEMENT COST (a) Tool or wheel change cost (b) Tool or wheel depreciation cost (c) Tool or wheel sharpening cost	$.15 per piece $.0835 per piece $.16 per piece	$.04 per piece
TOTAL	$.3935 per piece	$.04 per piece
(3) NONPRODUCTIVE COST Loading time x (labor + overhead) = (min) x ($ per min)	$.02 per piece	$.023 per piece
TOTAL MACHINING COST = (1) + (2) + (3)	$.543 per piece	$.113 per piece
SAVING = $.43 per piece		

Fig. 1—Saves two milling operations, finish grinding difficult-to-machine castings to close tolerances. Mattison Duplex Rotary Surface Grinder removes .060 to .070 in. stock from top and bottom surfaces of grey iron castings at the rate of 17.4 pieces per hour. One operator and one machine easily do the work formerly requiring two machines.

Fig. 2—Grinding time cut in half on the Mattison "Duplex," roughing Maxel steel shanks for carbide-tipped milling cutter blades. One operator and one machine now do a job that formerly required two operators and two machines. Stock removal is .050 in.

Try before you buy

Our engineers will be happy to test grind your flat pieceparts in the Mattison Methods Laboratory. Results of the test will be reported to you in the form of a complete cost evaluation, including production rate, tooling, type of machine best adapted to your work, finish, accuracy, wheel specifications, wheel consumption rate, etc. They will set the job up and demonstrate to you in Rockford the savings made possible on a high-powered surface grinder. There's no obligation—contact your local machinery dealer, or write to:

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Harig Mfg. officials compare first Fixture with 1000th Grind-All. Left to right: E. Wakat, Production Dept. Supervisor; K. Harig, Chairman of the Board; H. Harig, President; and T. Eckert, V.P. of Manufacturing and Grind-All inventor.

1000 Harig Grind-All Fixtures

By **M. M. Patterson,** Managing Editor

● Today became a milestone in the production of the unique Grind-All Fixture at Harig Mfg. Corp., 5757 W. Howard St., Chicago 30, Ill. One thousand have now been produced since its conception in 1950. This attests to the claims that the Fixture attains the maximum in precision grinding of perforators and punches up to 1-⅝" in diameter. Other features of the Fixture are its use in carbide grinding, radius dressing, inspection and light milling and boring.

The patented Grind-All Fixture was born of necessity. The making of irregular shaped perforators has always been a Toolroom problem. The toolmaker had to determine tangents to the shape, rough out the shape with a series of flats, and then blend in the flats as best he could or he sheared the punch to shape by using the hardened die block. Both methods are slow and do not meet increasingly strict tolerance and interchangeability requirements.

The answer to the problem is a fixture of high accuracy in which various radii can be generated. This in essence is the Harig Grind-All Fixture. It meets the need of generating radii through its sliding V-Block and its 24 divisions allow multi-sides and combinations of curves and straights to be produced.

The Fixture is built for precision of within .0002 for indexing and within .0001 for position of the V-block. An important feature is repeatability which is within .0002. The construction of the Grind-All consists of T-base, V-block slide plate, Spider index plate, V-block and clamp, super precision balls, index pin and adjustable stops. The design and manufacture of these parts holds the secret of the Fixture's success.

The T-base is made of free machining carburized steel hardened to 63-65 Rockwell "C". This material was carefully selected for its magnetic properties. The T-base is first ground on a surface grinder to within .0001" for squareness to the two faces. The finish tolerance of .0002" for the mounting hole is obtained by internal grinding. The races are ground to plus or minus .0001" to the mounting hole. The next operation is to jig grind the index pin hole within .0001".

The V-block slide which is made of O.H.T.S. hardened to 60-62 Rockwell "C", consists of the T-slot for mounting the V-block, a flat face for mounting attachments when the V-block is removed, grooves for the dovetail stop dogs and a chamfer on the back which forms one side of the V-type bearing slides. All contact surfaces are ground to within .0002" excepting the V-block slides which are held to within .0001".

The spider is also made of O.H.T.S. The slots of the spider are ground to plus or minus .0001" concentric to the hole. These slots are also held within five seconds on the arc. The other important surface on this part is the chamfer which when mounted to the back face of the V-block slide forms the bearing slides for the 36 super-precision balls. This feature insures the minimum play of the ball bearing action at all times.

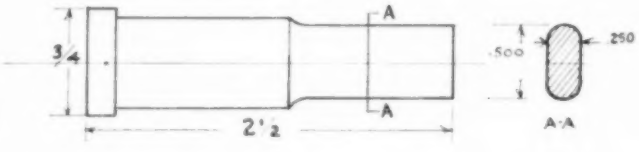
The graduated handle is made of aluminum and is graduated in 15 degrees. By using a sine plate it is possible to pick up between the graduations. A lock is provided to hold between the 15 degree

index slots. The numerical graduations are in two sets for three or four sided work. The crank handle is also made of aluminum and is mounted directly to the graduated handle.

The index pin which provides the positive stop on the 15 degree graduations is tapered to match the slots of the spider. This feature compensates for any wear which may occur on the pin or spider. A bayonet lock on the pin allows the pin to disengage for free rotating.

The V-block dimensions are held within .0001". The material used is oil hardened tool steel which is hardened to 62-64 Rockwell "C". A single screw holds the V-block to the V-block slide by means of a clamping plate which rides in the slots of the V-block slide. A spring located around the screw maintains tension on the V-block at all times thus holding the V-block from dropping when the screw is loose and set-ups are made. Dust seals are provided on both sides of the mounting hole to prevent foreign matter.

In terms of time the Grind-All Fixture has cut the production time of perforators and increased the accuracy substantially. The following is a typical example:



PRODUCTION TIME FOR THIS PERFORATOR
SHEARING METHOD

Finish Turn	30 min.
Mill rectangular	30 min.
Shear, file and fit	110 min.
Polish	20 min.
Total Time	3 hrs. 10 min.

Accuracy ±.0015

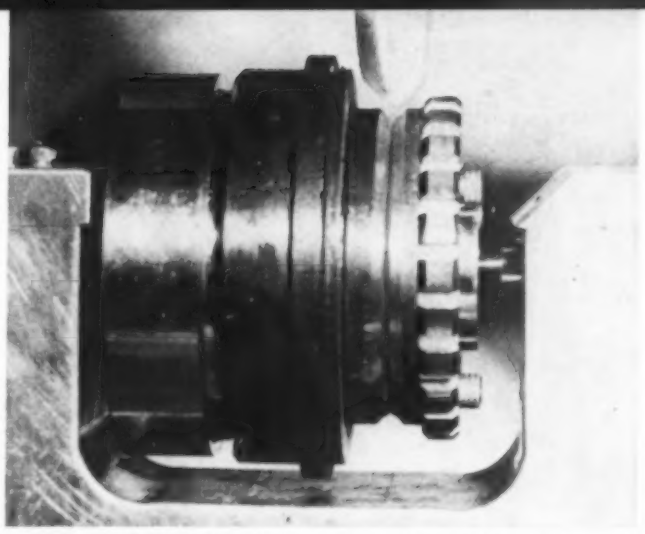
HARIG GRIND-ALL FIXTURE

Rough turn	20 min.
Cylindrical grind	20 min.
Grind rectangular and radius w/Grind-All	70 min.
Total Time	1 hr. 50 min.

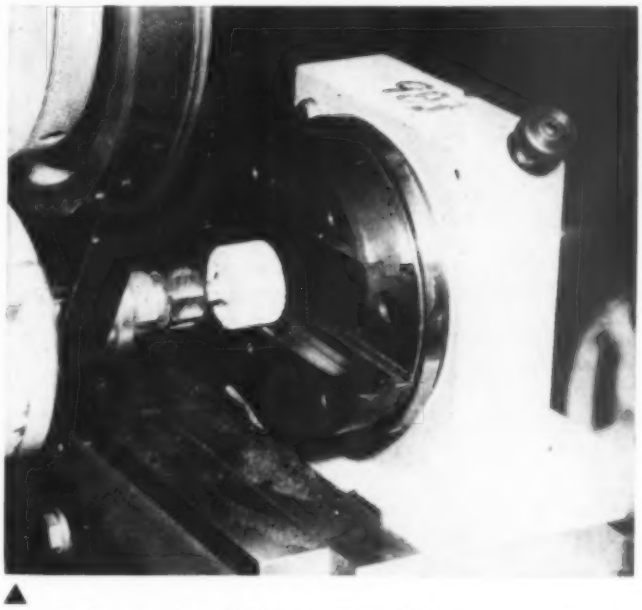
Accuracy ±.0002

Of course the advantage with the Grind-All Fixture is even greater when a quantity of perforators is involved because it is a set-up operation, whereas with the shearing method there is no standard set-up to speak of.

Still another example of the fixture's usefulness happened to present itself quite unexpectedly to the Harig management. They received an order to make cams from Collins Radio Corp. and during the negotiations Collins suggested they send their own checking device for Harig to use while making the cams. The device turned out to be a Grind-All which was set-up to check the rise of the cams every 15° with an indicator. • • •

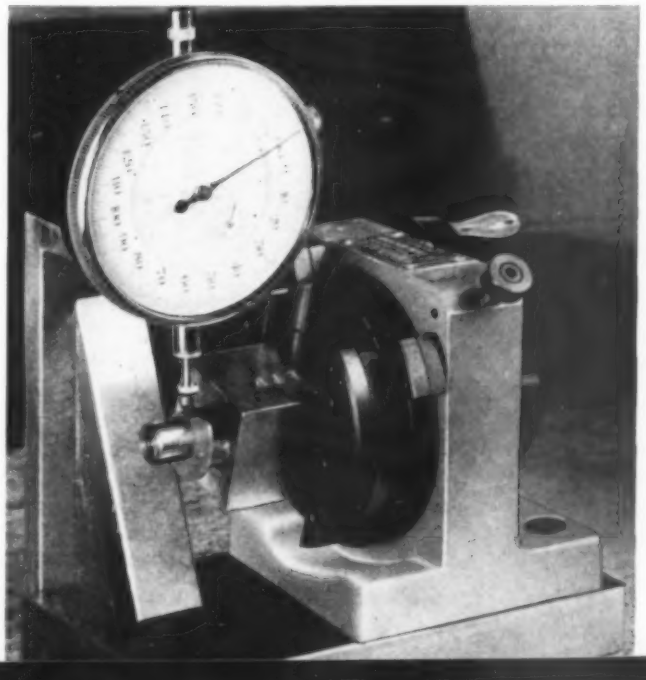


Grinding of the chamfer on the spider index plate and the V-block slide plate provides the bearing slides for the balls.



▲ *The T-slot on the V-block slide plate are ground to within .0001".*

Collins Radio Corp. used the Grind-All for checking cams. The rise of the cam is checked every 15 degrees. The Grind-All fixture is shown here being used to grind a punch. Set up time is greatly reduced. ▼



NEW

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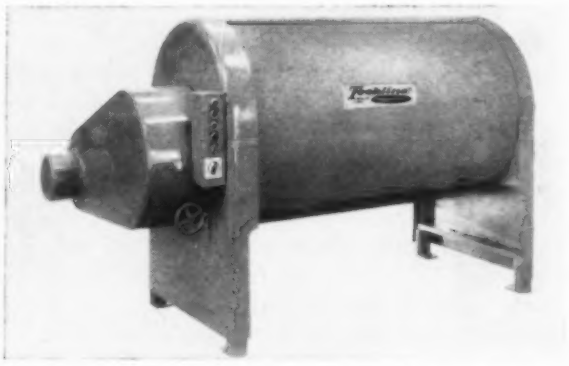

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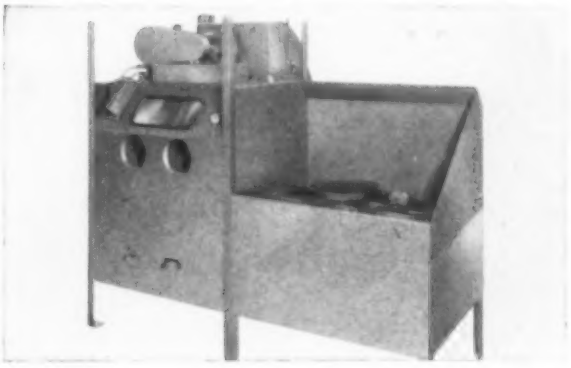

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Techline design engineers are specialists in precision finishing, with long experience in designing equipment and planning efficient processing operations. Their designs include many exclusive features that are far ahead of any similar machines now available. And Techline offers a complete range of media, compounds and abrasives, all carefully selected and accurately formulated to consistently produce the finish you specify.

Techline's modern research and testing facilities are at your service. Their application engineers will analyze your finishing problem and process samples of your work, to determine the most effective and economical combination of process, equipment and abrasive for you to use.

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Yet CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.* So, we think you'll agree it's worth investigating CINCINNATI (PD) WHEELS right away.

Just contact us and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

Remember—*only* CINCINNATI Grinding Wheels give you . . .

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CINCINNATI° Grinding Wheels

Grinding Is Safe if...

By **Richard L. McKee**

• Grinding is one of the safest operations in the field of stock removal. More than a half-century of intensive education and effort by safety engineers, manufacturers, machine builders, organizations like the National Safety Council, and a lot of plain John Does, employees, have brought about a substantial reduction in both the number and the seriousness of accidents resulting from the use of abrasives.

Yes, grinding is a safe operation, if . . .

The abrasive has been properly selected for the application.

It is used on a suitable machine, in proper running condition.

It is adequately guarded.

The dust collection system is properly set up and operating.

There is adequate protection against spontaneous combustion of the grinding swarf.

All operators are wearing safety goggles or face shields, with protective clothing, as required by the job.

Recommended procedures are followed.

These are things which every plant manager, every foreman, every safety engineer knows by heart. When they become instinctive with John Doe, average employee in the tool room and on the production lines, we'll be getting close to the only acceptable level of achievement—no accidents! • • •

Bench grinding (above) and snagging (below) are radically different abrasive operations. Both are safe when proper precautions are taken. Note placement of work rest on the bench grinder, and the goggles, gloves and heavy apron on the swing frame grinder operator.

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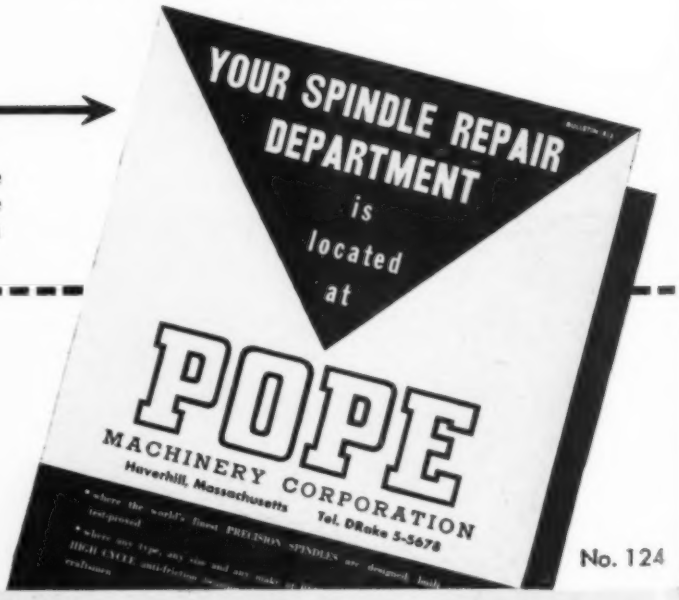

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SHOP HINTS

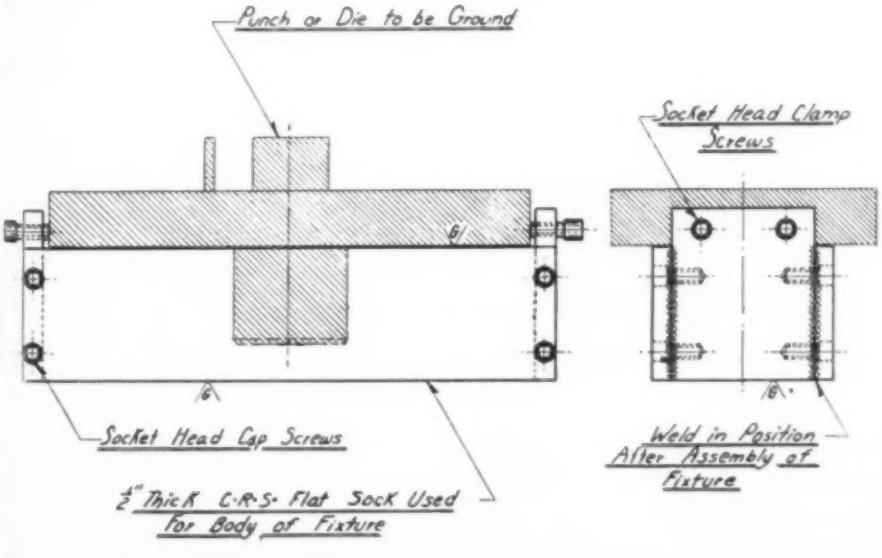
Fixture for Grinding Assembled Punches, Dies

By **Frank L. Rush**

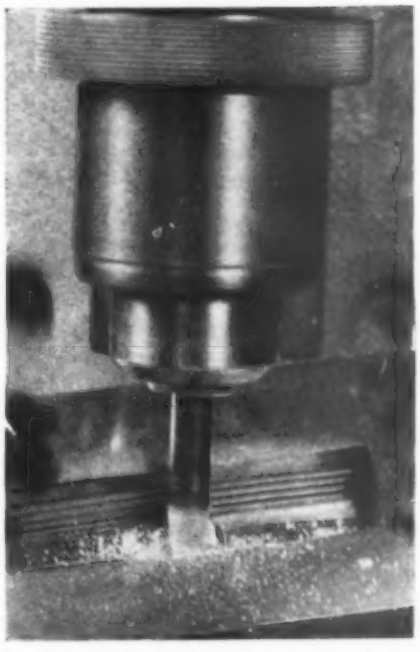
● The drawing shows a very simple but effective fixture for grinding punches and dies while assembled. Use of this fixture removes a great deal of error in parallelism of the units caused by assembling and dis-assembling of the units for grinding.

The entire fixture can be constructed from one-half inch C.R.S. flat stock. The sides and ends of the fixture are held in alignment by the use of socket head cap screws, while the sides and ends are welded onto each other to provide for a good solid fixture. The fixture is then ground on the indicated surfaces shown on the drawing to provide a flat, true surface on which to rest the punch or die that is to be ground. The work-piece is clamped in position in the fixture by the use of suitable clamp screws, socket head, or otherwise. The length, width, and the number of screws to be used in the fixture depend, of course, upon the dimensions of the work-piece that is to be ground in the fixture.

After the fixture is placed on the chuck of the surface grinder, the work piece is clamped in position in the fixture for grinding. •


Punch or Die to be Ground
Socket Head Clamp Screws
Socket Head Cap Screws
Weld in Position After Assembly of Fixture
½" Thick C·R·S· Flat Sock Used For Body of Fixture

Sketch of punch and die grinding fixture.



Stub of typewriter eraser polishes mold cavity.

Eraser Stub for Polishing

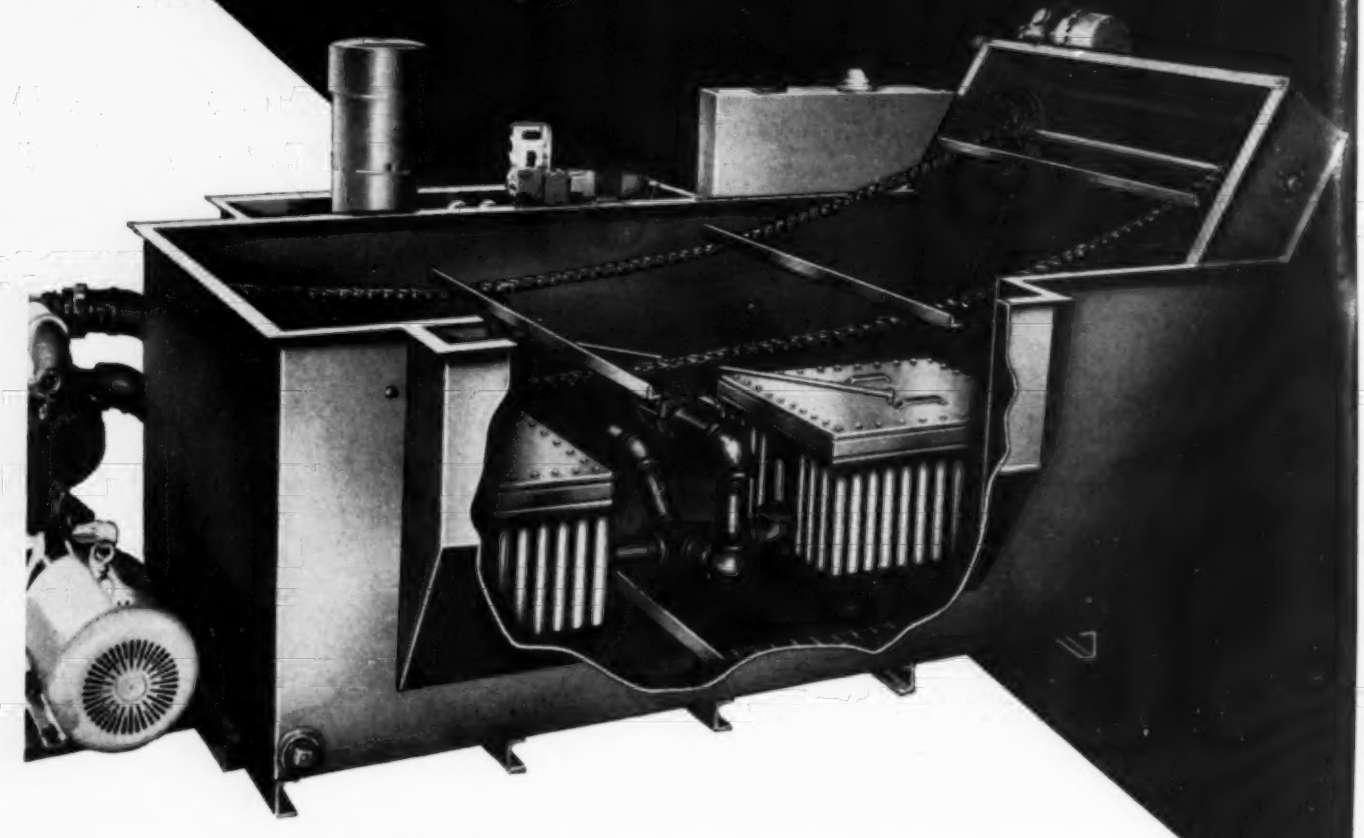
By **H. J. Gerber**

● A short stub of typewriter eraser, of the pencil type, makes a very fine polishing point for jobs similar to the one illustrated. An eraser of this kind has a very mild abrasive impregnated in the rubber core and will produce a fine polish in places which are inaccessible with ordinary polishing tools.

The pictured job is a small steel plastics mold in which the fine detail of the cavity is being given a final finish. The wood body of the eraser is held in the chuck of a high speed bench drill but it can also be used in a small hand grinder or high speed flexible shaft unit. •

for versatility in filtration

CFC Delpark FILTER-MATIC



CFC Delpark Filter-Matic gives constant vacuum filtration for all types of fluids such as coolants, cutting oils, rolling oils, and solvents.

To meet *individual* fluid characteristics and flow rate, you have a choice of Leaf-Type or Tubular Screen elements plus a variety of metal screen or natural fibre media.

Dual manifold design allows uninterrupted filtration — one manifold on filtering cycle while the other is on backwash or cleaning.

Pre-coat filter aids may be used to give absolute filtration.

Write for technical literature to Department GF

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MICRO-CLARITY AT MINIMUM COST

Fulflo FILTERS

with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.

CFC FILTERS

Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.

wherever abrasive operations are performed

Free Literature

1. Abrasive Cutting Center. Folder DH-20 describes the Allison-Campbell new demonstration laboratory. The full complement of Campbell abrasive cut-off machines—the chop stroke, oscillating, horizontal and rotary types for dry, wet or submerged abrasive cutting processes and the complete line of Allison abrasive wheels—are displayed. Solid bar stock and structurals up to 12"x12", plate up to 4" thick, and pipe or tubing up to 8" O.D. can be cut in a matter of seconds, according to the folder. Companies are invited

to submit samples of stock and/or witness cutting tests. Allison-Campbell Division, American Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport 2, Conn.

2. Component Parts of Jigs and Fixtures are diagrammed, with specification tables for different sizes included, in 24-page catalog. Items as L pins, T pins, angle brackets, clamp rest screws, coupling nuts, C washers, knurled nuts, clamp assemblies, clamp straps, diamond pins, are among the numerous products illustrated and described. Carr Lane Manufacturing Co., 4200 Krause Court, St. Louis 19, Mo.

3. Helixpoint Drills, as produced on the Steptool relief grinding fixtures, features self-centering and free-cutting action, according to bulletin. Better hole roundness and straightness is claimed possible. Lip concentricity and indexing are said to be held within .0003". The bulletin covers two case histories of performance and describes the grinding fixture used for grinding Helixpoints on drills from No. 80 through 1" diameter. 3/8" drills can be ground at 120 per hour. The fixture also permits sharpening core drills, stepdrills, countersinks, and taps, and is used on any surface grinder or tool grinder. Steptool Corp., 3613 E. Olympic Blvd., Los Angeles 23, Calif.

4. Universal Chuck for Cylinder Grinding Wheels is described in folder available. A simple turn of a Jacobs key locks the wheel on-center. The chuck is said to prevent vibration and chatter, eliminate sulphuring, and permit wheel changes in seconds. It exerts equal pressure on all jaws. The chuck automatically centers the grinding wheel with the spindle as the jaws tighten against the grinding wheel. It is available in sizes to accommodate all standard wheels from 6" to 20" diameter. Instructions are given for ordering. Lindgren & Sons Machine, Inc., Groton, Mass.

5. Bench Type Oscillating Grinder. According to recent brochure, the GF-0 grinding and lapping machine was designed for use with the manufacturer's Neven diamond impregnated wheels, ensuring a high quality edge on a tungsten carbide lathe tool in a short time by an unskilled operator. A carefully designed reversible guard gives maximum access to the wheel, and restricts spray from the coolant giving clean operating conditions. The 1 hp motor rotates at 2,850 rpm. Total indicator reading is within .0005". Construction and operational features are given, with dimensional drawings. The Wickman Manufacturing Co., 10325 Capital Ave., Oak Park (Detroit 37), Mich.

6. Dial Indicator. Boice Gages introduce their dial indicator as the only completely gearless indicator built to A.G.D. Standards. The instrument is shown clearly diagrammed. The hand responds to minute movements of .00002 or better, according to the flyer available, and the dial and pointer permit accurate readings without chance of error due to parallax. Boice Gages, Hyde Park, N.Y.

7. "You're On the Road to Better Drilling" is the title of a 28-page booklet which shows how improved precision and economy may be obtained in drilling operations. The new Cincinnati spiral point drill geometery is explained. The Cincinnati Spiropoint drill sharpener is described as grinding a spiral point on a standard twist drill in a matter of seconds. A handy record section is provided in which the operator can jot down drill point angles, speeds, feeds, coolant, and other data he has found to be best suited for specific jobs and materials. Cincinnati Lathe and Tool Co., 3207 Disney St., Cincinnati 9, Ohio.

(See Number 2)

(See Number 3)

Use the postpaid card opposite page 80 to receive your copy of any of the literature listed on these pages. Just circle the proper number on the card which coincides with the number which precedes the paragraph. We'll do the rest.

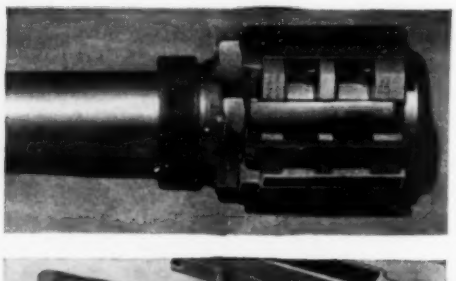
WHY MICROHONING* TOOLS ASSURE

ECONOMY—PRECISION—PRODUCTION

COST FACTORS (labor, maintenance, scrapped parts, productivity, etc.) DETERMINE MACHINE TOOL EFFICIENCY.

To Minimize Those Cost Factors, Micromatic has developed Microhoning tools that offer a new concept in metalworking. This concept (known as the Microhoning process) assures controlled abrading, efficient stock removal, accurate generation of geometry and size, and produces uniform, functional surface finishes.

Because Microhoning removes inaccuracies of preceding operations, it is usually the final stock removal operation. Therefore, Microhoning tools are designed and applied to produce high precision, assure a minimum of scrap and protect the user's investment in previous processing operations.



New! Tru-Float tool has a universal joint within the abrading unit. This design provides maximum accuracy and float, uniform abrading and surface finish, less wear of abrasives, retention of original bore location, and minimum stock removal to correct inaccuracies.

Micromold assemblies have plastic or soft metal shells that minimize tool wear and protect the edges of abrasive sticks from the harsh dressing action of extremely rough bores. This abrasive stick design eliminates many parts previously required to hold abrasives and expand the tool.

Tool designed for Microhoning tandem bores has plastic guides between banks of abrasives to stabilize the tool as it passes over bore interruptions.

Because use of the proper tool is so important, Micromatic designs Microhoning tools to suit the individual work piece, and integrates tool design with machine and fixturing to provide the ultimate in operating efficiency.

*Registered U.S. Pat. Off.

MICROMATIC HONE CORP.

8100 SCHOOLCRAFT AVENUE · DETROIT 38 MICHIGAN

FREE LITERATURE continued

8. Surface Grinder. The Harvel No. 1016 surface grinder is described in recent folder, with diagram of measurements and also specifications included. The alloy steel spindle is heat treated and ground and mounted on paper precision preloaded ball bearings, completely sealed and lubricated for life. The table working surface is 10" x 16", and it accommodates any chuck up to a full 160 sq. in. of surface area. All feeds are by hand. Specifications include 1750 rpm spindle speed, and 1 hp direct motor spindle drive. Harvel Co., 5135 Coffman-Pico Rd., Pico, Calif.

9. Cooling Coils. Bulletin No. 880 describes the Herman Nelson cooling coils. The bulletin contains complete coil selection information as well as detailed descriptive information on the coils themselves. Included, in addition to more than 20 photograph illustrations, are construction specifications, dimensional data, surface charts, and circuiting diagrams. The coils described are direct expansion coils, and both standard and cleanable tube water coils. Selection examples for cooling with dehumidification and cooling without dehumidification are given. American Air Filter Co., Inc., 215 Central Ave., Louisville 8, Ky.

10. Hand-Stroke Belt Sander. A catalog sheet on the Boice-Crane 6" x 60" hand-stroke belt sander has been issued. Abrasive belts are 6" wide x 14'1" circumference. Belt speed is 3000 sfm. The sander's capacity covers areas 29" wide x 60" long, 0 to 4" thick. New features described and illustrated include a machine-tool type base, anti-friction bearings, free-rolling work table, and engineering for faster stock removal. Boice-Crane Co., 839 W. Central Ave., Toledo 6, Ohio.

11. Dial Gages. Flyer describes how the manufacturer produces several types and sizes of dial gages by building a number of gages around one dial indicator housing. Because the gages are furnished in distinguishing colors, each department can now identify its gages. Bore size extensions for the dial bore gage are available in a variety of sizes and are reported to permit checking bores up to 2' in diameter. The right angle dial bore gage and the dial snap gage are also pictured and described. Cavalier Gage Co., Poughkeepsie, N.Y.

12. Power Drilling and Checking Fixture. As described in flyer, the M-M Check is not only a checking fixture, but can be used as a grinding fixture for grinding any combination of slots, squares, and hexagon. It has 24 equally spaced slots for checking angles on any degrees. The unit may be motor driven or hand operated. The Model S-24 is made for applications that require less accuracy, with tolerance of .002. Model P-500 is designed for close tolerances, with .0003 accuracy claimed. M-M Tool Mfg. Co., Dayton 2, Ohio.

13. Linear Actuating Equipment. Application data handbook describes the Inchworm Motor Type 202 as a linear actuator to fulfill the need for a powerful feed mechanism accurately controlled in increments of millionths of an inch. It is being used as a control for throughfeed centerless grinders. The motors are being used manually operated under direct operator control, or they can be incorporated into completely automatic closed-loop systems. A single operating cycle diagram is given, as well as outline and installation dimensions and load characteristics in diagram and chart form. The modification kit, control panel and heavy force armature are also described. Airborne Instruments Laboratory, Inc., 1345 New York Ave., Huntington Station, N.Y.

14. Instrument Bench Centers. Bulletin No. ST-005 describes the No. 9205M instrument bench centers which check work on centers either horizontally or vertically. The portable unit sets up speedily on a surface plate to check concentricity, runout, and squareness of face to O.D. or axis on any work up to 8" long x 3" diameter. The bulletin gives instructions for setting up, along with complete specifications. The Taft-Peirce Manufacturing Co., Woonsocket, R.I.

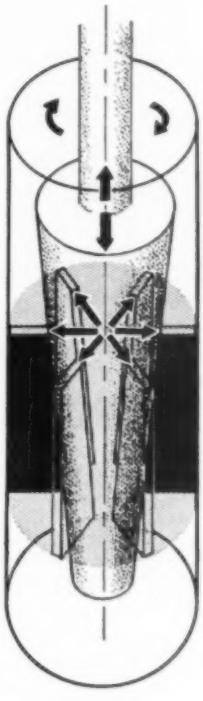
15. Cutting Oils. Bulletin No. 25 discusses the Sunicut W Series cutting oils containing the all-mineral additive, Petrofac, which is said to provide odorless quality, light color, and transparency to the oils. Sunicut 105W is a transparent type sulferized cutting oil for general duty on lathes, milling machines, and drill presses. Sunicut 110W, for broaching, gear cutting, and tapping, is designed for heavy-duty machining of tough, hard alloys. Sunicut 812W and Sunicut 11W are also described. Industrial Products Dept., Sun Oil Co., P.O. Box 1192, Albany, N.Y.

". . . Just one of our 'dry' grinder operators."

HOW MICROHONING* TOOLS PROVIDE

ECONOMY—PRECISION—PRODUCTION

When a precision stock removal process minimizes cost factors (labor, maintenance, scrapped parts, etc.) then volume production at lower cost per piece is possible. Here's how the distinctive design and performance of Microhoning tools provide all three—economy, precision and production.



EFFICIENT OPERATION

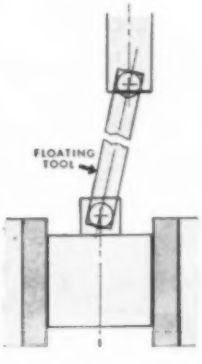
Micromatic expands, rotates and reciprocates the abrading tool in the bore. Through this controlled combination of pressure and movements, abrasives are self-dressing for effective and continuous cutting action. Long abrasive sticks are evenly spaced around the tool to keep it stable. They effectively bridge surface irregularities and generate a geometrically true cylinder.

REDUCES OPERATOR COSTS

Micromatic "Adjusting Heads" give operator complete and positive control of tool expansion. Or, automatic controls can be used to perform all tool adjustment and gaging. They assure accurate duplication in every part produced.

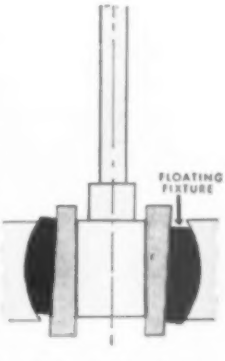
MINIMUM MAINTENANCE

Micromatic tools are designed for durability, especially at all stress points and joints. Plastic or soft metal holders prolong abrasive life, greatly reduce tool wear.



MAINTAINS ORIGINAL BORE LOCATION

Micromatic either floats the tool or the work holding fixture so tool and work piece can automatically align themselves. This assures cutting-unit rotation coincides with neutral axis of bore.



WRITE FOR LITERATURE

Micromatic produces tools best suited to the production of individual work pieces. And properly integrates the tool with machine and fixturing for peak productivity at lowest cost per piece produced.

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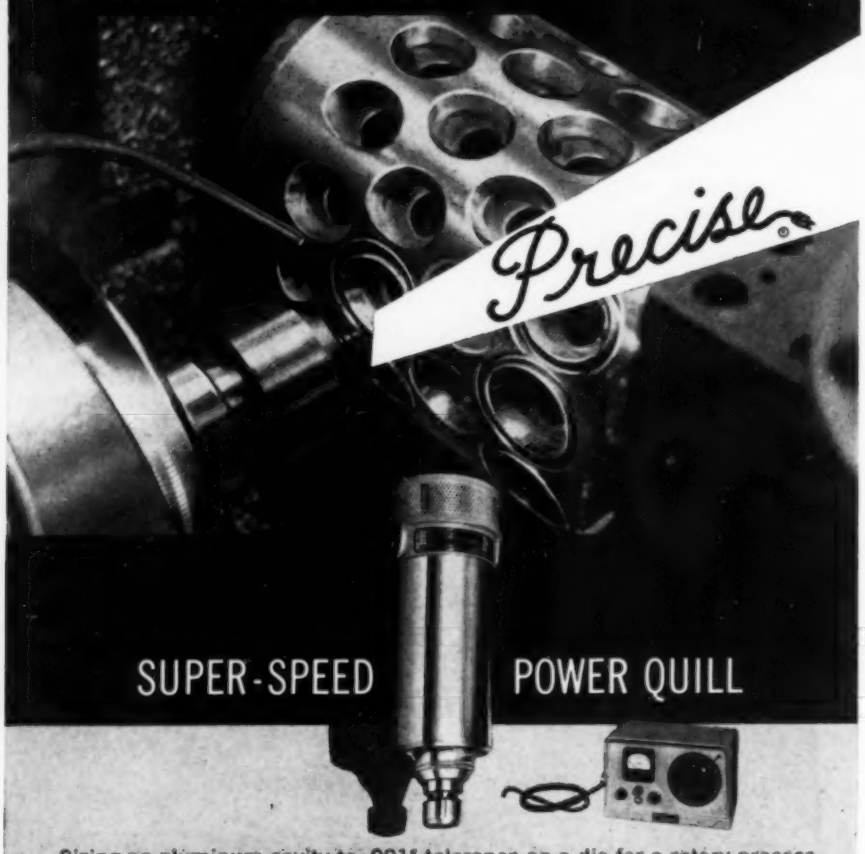
INCREASES TOOL LIFE 300%



SUPER-SPEED POWER QUILL

Sizing an aluminum cavity to .001" tolerance on a die for a rotary process machine at R. P. Scherer Ltd., Windsor, Ontario, was a simple operation for a PRECISE Super 80 POWER QUILL. This Super-Speed POWER QUILL —mounted on a standard machine tool—not only held the prescribed tolerance but cut production time 31½ hours and increased tool life 300% over previous machining methods.

PRECISE Super-Speed POWER QUILLS meet every production and toolroom requirement and are quickly mounted with PRECISE mounts on standard and special machine tools. They mill or grind the hardest alloy steel, soft plastic, wood and rubber, aluminum, Masonite and even glass. Their superhigh speeds, high torque, spindle and chuck rigidity permit the use of the hardest cutting tools for faster stock removal, improved surface finishes, maximum tool life, and the maintenance of tolerances to .0001". Adjustable spindle speeds range from 15000 rpm to 45000 rpm with power ratings up to 1½ hp from ordinary 110v or 220v power supplies.

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FREE LITERATURE *continued*

16. Automatic Saw Sharpeners. Recent brochure describes the sharpener as sharpening all metal cutting saws from finest teeth to 2 per inch. It sharpens circular saws to 16" diameter; band saws to 2" wide, and hack saws to 2" wide x 24" long. Illustrations are given of the 3-in-1 sharpener used as a circular, hack, and band saw sharpener. Complete specifications are included. Hamco Machines, Inc., 99 Mt. Hope Ave., Rochester 20, N.Y.

17. "New Hard Surfacing Fact File" gives helpful data on the Murex line of 88 types and sizes of Hardex hard surfacing electrodes and rods. Complete data for reference files is listed on 3" x 5" cards. A wide selection of electrodes offers matching of deposits to requirements for hundreds of hard surfacing applications. Hardex-Auto wires are available for semi-automatic submerged arc welding. Metal & Thermit Corp., Rahway, N.J.

18. Metal Building Insulation. A 12-page publication with photos, tables, and sketches illustrates and describes use of Fiberglas flexible and rigid metal building insulations. Discussed are heat losses and condensation and accessory materials for metal buildings, such as reinforced plastic paneling, ceiling board, acoustical tile, and perimeter and pipe and duct insulation. Owens-Corning Fiberglas Corp., Toledo 1, Ohio.

19. Sound Film on Boring Heads. A color-sound strip film on the design, construction and application of high-precision boring heads has been released. Boring heads designed around the patented Briney Principle can be adjusted in increments smaller than 1/10,000" without loosening or tightening any screws. Running time is 11 minutes. The film can be used to train machine operators in the handling of these tools. Briney Mfg. Co., 1165 Seba Rd., Pontiac, Mich.

20. "Standard for Production, Processing, Handling, and Storage of Titanium" is the title of a new NFPA standard on the fire and explosion hazards associated with the production, processing and storage of titanium. On present knowledge of the characteristics of the metal and processes, the standard urges caution in adopting any untried methods. Properties and characteristics of titanium with combustibility tests are discussed. Its use and precautionary measures are given for sponge and powder production, melting plants and mills, and machine shops. National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass.

21. Variable Displacement Gear Pumps. Recent catalog describes the operation of the Pesco variable displacement internal-external pump. Description is supplemented with three-color schematic drawings. One view shows zero displacement pump operating position; the other view shows full displacement pump operating position. Included in the catalog is a list of advantages of the pump and suggested applications for aircraft, commercial and industrial equipment. Pesco Products Div., Borg-Warner Corp., 24700 N. Miles Blvd., Bedford, Ohio.

Abrasive Society News

Flint, Michigan, Chapter Organizes

A panel discussion on man-made diamonds, presented by General Electric Company and The Carborundum Company, featured the first meeting of the newly-organized Flint, Michigan, Chapter, held September 24 at General Motors Institute. For the November Meeting, six weeks later, a program on centerless grinding is planned.

Temporary officers and board of governors of the chapter, elected at an organization meeting in July, are: President—Robert C. Moore, Buick Motor Division; First Vice-President—William Bendle, A. C. Spark Plug Division; Second Vice-President—P. R. Blanchard, Cortland Grinding Wheel Company; Secretary—John M. Diem, Buick Motor Division; Treasurer—Thomas A. Hancock, The Carborundum Company.

Serving on the Board of Governors are Kenneth B. Jackson, Buick Motor Division; Francis H. Martin, A. C. Spark Plug Division; Lawrence C. LaFrance, Simonds-Worden-White; J. Lane, Buick Motor Division and A. Ross Boergert, Macklin Sales Company. David Biggs, C. C. Brown and R. H. Merchant were chosen as Program Co-Chairmen.

Long Island Chapter—J. T. Roberts, of International Research and Development Corporation, was the speaker at the first fall meeting of the Long Island Chapter, held September 10. The October program will be presented by Cincinnati Milling Machine Company, and the November meeting, on "Bonded Abrasives," by The Carborundum Company. The annual election of officers will take place at the December meeting, which will otherwise be informal. Bert J. Kemper is president of the chapter. Herman Golden, 71 Lion Lane, Westbury, is secretary.

Hudson-Mohawk Chapter—"How to Select a Grinding Wheel," a new full color sound motion picture produced by Norton Company, high-lighted the program of the first of the 1958-1959 series of chapter meetings, held on September 8 at Menands, N. Y. Tentative plans for future meetings are for a tour of snagging and grinding operations at Allegheny-Ludlum, one of the world's most modern steel producing plants, in October. In November, Curtin-Hebert Co., Inc., of Gloversville, will present "Micro-Finishing with Abrasives," the full story of tolerance finishing with coated abrasives on wood, leather, metal and other materials. Those interested in attending these meetings should get in touch with C. F. Regan, Behr-Manning Co., Watervliet, N. Y.

Boston Chapter—Color slides and a talk by Dan Weedon of The Blanchard Machine Company featured the program of the Boston Chapter's September meeting. In October, Curt Cummings of Allison Division, American Chain and Cable Company, will bring to the group a color motion picture, "Abrasive Cut-Off Machines and Wheels," as well as speaking on the subject. A film and a talk on "Tumbling" by a representative of Roto-Finish Company are scheduled for the November meeting. After that, the next general meeting will be held in January, 1959, since no meeting is planned for December. I. C. Day, of Cutter, Wood & Sanderson Company, 222 Third Street, East Cambridge, Mass., is secretary of the chapter.

Reading Chapter—At the September 15 meeting of the Reading Chapter, Robert C. Fisher of the Grinding Wheels Division of The Cincinnati Milling Machine Co. spoke on "The Ins and Outs of Grinding Wheels." Robert Wilhelm of Allison Co. will speak to the chapter October 20 on "Abrasive Cutting-Off." Reservations for meetings of the Reading Chapter should be made with Paul A. Miller, 23 East Park Road, Wyomissing Hills, Pennsylvania.

Detroit Chapter—Nominations for officers of the Detroit Chapter, to be voted on at the October meeting, are the following: President, Emil Vogely; First Vice President, Fred Schlie; Second Vice President, Dick Sorensen; Third Vice President, John Gills; Secretary, Gene Kiezel; Treasurer, Ray Columbo. The retiring president, Cal E. Edwards, announced at the June meeting that Emil Vogely would have charge of publishing the chapter's Newscast. The program consisted of a presentation on "Electrolytic Grinding" by Anocut Engineering Co. Reservations for the October meeting should be made with Edwards, 11368 Asbury Park, Detroit.

Western Michigan Chapter—Installation of officers took place at the September 15 meeting. John Kennedy and N. A. Mathews of General Electric Co., and John Mueller and John Ripple of The Carborundum Co. conducted a panel discussion on man-made diamonds. New officers installed were: Chairman, Ralph Ploughman; Vice-Chairman, Charles J. Hennesen; Secretary-Treasurer, Paul Starks; Trustees, Sidney Tornga, William McCormick, and Paul Watson.

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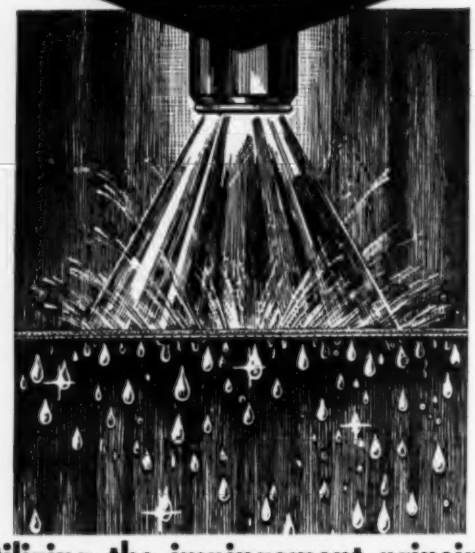

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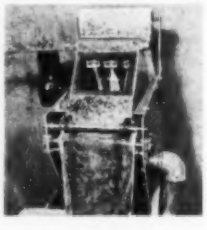

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BOOK REVIEW

Coated Abrasives—Modern Tool of Industry, Coated Abrasives Manufacturers' Institute, 426 pages, published by McGraw-Hill Book Company, Inc., New York. Price $8.50.

In attempting to bring together in one relatively short volume the accumulated information of years of experience with coated abrasives, the Coated Abrasives Manufacturers' Institute has undertaken a difficult task. The book they have turned out is a credit to the Institute and to its members, whose top technical personnel have contributed substantially in the development and review of the material. This is the first book on coated abrasives which attempts so complete a coverage.

Probably the first half of the book, dealing with coated abrasive machines, automation, backup devices such as contact wheels, drums and platens, and the various coolants and lubricants in addition to the chapters dealing specifically with the grinding and finishing of metals, are of most interest to the majority of readers of GRINDING and FINISHING Magazine. There is also much of value in the last three chapters, which deal with cost factors in the use of coated abrasives; safety, storage and handling; and case histories, respectively.

The book is well-illustrated, containing over 500 pictures, charts, graphs, tabulations and diagrams. It also contains a glossary of terms which, for the most part, have specialized meanings in the field of coated abrasives.

As the first book which attempts to cover the whole field of coated abrasive applications, and published under the auspices of such a group as CAMI, this is a significant and authoritative publication in the abrasive field.

The following companies are members of the Coated Abrasives Manufacturers' Institute:

Abrasive Products, Inc.
South Braintree, Massachusetts
Armour and Company
Alliance, Ohio
Atlas Abrasives Corporation
Greenwich, Connecticut
Behr-Manning Co.
A Division of Norton Company
Troy, New York
The Carborundum Company
Niagara Falls, New York
Clover Mfg. Company
Norwalk, Connecticut
Michigan Abrasive Company
Detroit, Michigan
Mid-West Abrasive Company
Owosso, Michigan
Minnesota Mining and Manufacturing Company
St. Paul, Minnesota
Sandpaper, Incorporated
Rockland, Massachusetts

... wherever abrasive operations are performed

New Equipment and Materials

Hand Grinder Designed For Operator Convenience

The 6" adjustment of the Model DH-612 precision surface grinder permits

the best height for every operator in either standing or sitting positions. The downfeed handwheel is placed at eye level. Each revolution of the handwheel equals .025" feed. This widens the calibrations so that "split tenth" grinding is said to be performed without eyestrain. The crossfeed handwheel also has wide .0005" graduations. The table feed handwheel can be located on either side of the saddle for right or left hand operation.

Other large grinder features are 1 hp motorized spindle, all way surfaces and feed screws lubricated by a positive one-shot system, and all bearing surfaces precision ground and dust-sealed by metal guards.

An optional feature is a versatile coolant system, which permits both flood coolant and the manufacturer's "cool grinding" through the wheel. There is also a hydraulic table feed attachment.

A complete line of attachments and accessories include electro-magnetic chucks, permanent magnet chucks, sine chucks, radius dressers, wheel balancer, among others.

The DoAll Co., Des Plaines, Ill.

Use postpaid card. Circle No. 102

Pumping, Filtering Chips Ups Grinding Time 15%

International Business Machines Corp. has boosted operating time 15% on five Blanchard grinders in its Endicott, N.Y. plant by installing a central filtration and pumping system for handling coolant and grinding chips. The system, including a Deming industrial pump, has handled about 720 tons of machine tool shavings in the past two years. The coolant washes steel, grey iron and aluminum chips from the grinding wheel and flows by gravity into a floor sump, 2' in diameter and 4' deep.

Close up of grinder showing coolant flooding table.

Vertical spindle surface grinders, using system.

A 400 gpm Deming industrial pump, originally designed for handling plant sewage, pumps the coolant and grindings out of the sump and into a new filtration system. The coolant is filtered and returned to the cooling lines of the five grinders. The sump and filtration system handle an estimated 2400 lbs. of chips in each 16-hour operating day.

The Deming Co., Salem, Ohio.

Use postpaid card. Circle No. 101

60 Degree Angle Tool-Grinding Attachment

A simple attachment for quickly and accurately grinding 60° angle thread-cutting tool bits eliminates the slow and painstaking grinding as well as the constant comparing with a 60° gauge.

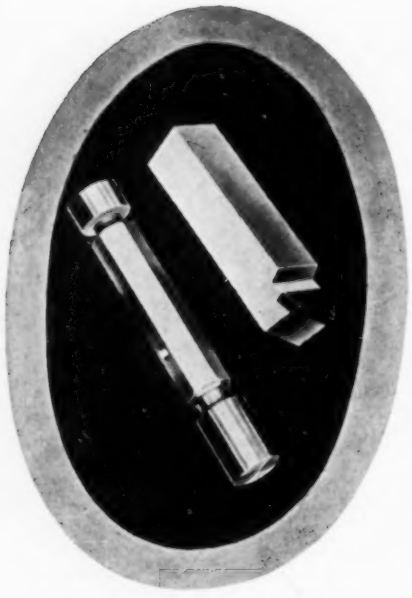
The unit is designed for use with any conventional pedestal tool grinder or bench grinder used in large machine shops or small hobby shops. It has

only two moving parts and is made of hardened and ground steel.

Horst's Machine and Experimental Shop, 2801 Steele St., Denver 5, Colo.

Use postpaid card. Circle No. 103

For further information on any of the products listed here, use the handy postpaid card opposite page 80.



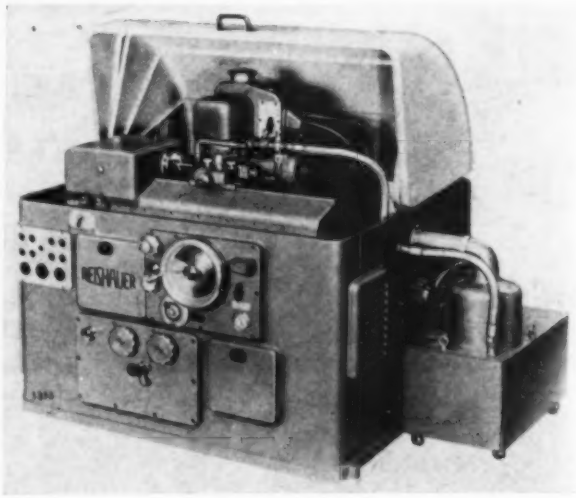
For increased output and accuracy, finish your tools and gages with HYPREZ DIAMOND COMPOUNDS

Virgin Diamond particles, graded in our own laboratories, are uniformly dispersed in the exclusive Hyprez vehicle for maximum cutting action. They produce finer results faster on every finishing job... Your nearby Hyprez distributor will help you solve any lapping or polishing problem that may arise.

Write for free demonstration or technical bulletin No. HG-108

HYPREZ DIVISION
ENGIS EQUIPMENT CO.
431 S. Dearborn St., Chicago 5, Illinois

Thread Grinding Machine For Small Parts



A single-purpose machine, the Reishauer RAG, was developed to provide high precision thread grinding on small parts such as taps with straight and helical flutes (with or without relief), and small worms with fine pitches. Single-rib grinding wheels with longitudinal feed are used. As the operation is almost completely automatic, the operator need only change the workpiece after set-up.

Re-profiling of the grinding wheel occurs during the return stroke of the table slide, with a choice of three different re-profiling speeds. Automatic feed compensation for decreased wheel diameter permits grinding to perfect finished dimensions, greatly reducing subsequent measuring time, according to the report.

The machine is equipped with an automatic, electric truing device with two easily adjusted dressing heads that operate independently but simultaneously. Also available is an electric truing device with one dressing head in which one diamond tool oscillates along both flanks and describes a radius if desired.

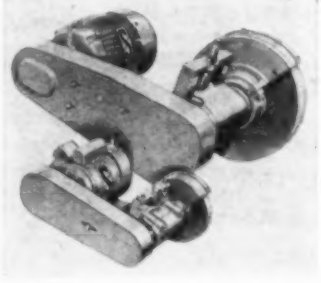
The maximum grinding length is 9¾"; distance between centers, 20"; maximum workpiece diameter, ¾", and minimum workpiece diameter, 0.04".

Cosa Corp., 405 Lexington Ave., N. Y. 17, N.Y.

Use postpaid card. Circle No. 104

New Line of Motorized Grinding Spindles

The combination illustration shows the smallest and the largest of the new



line of motorized grinding spindles in sizes ranging from a ½ hp unit for 6" diameter grinding wheel to the 20 hp size for 24" diameter grinding wheel.

The machine assembly consists of a heavy ribbed combination base supporting the motor and the integral angular-positioned dovetail slide. The precision grinding spindle assembly has a bracket housing having integral dovetail to accomplish the required vertical spindle adjustment without raising or lowering the entire machine.

The ratio on the belt drive is computed to deliver the correct peripheral speed on intermediate diameters of wheels and permits further speed change, either through change-pulleys or original equipment with step-pulley range.

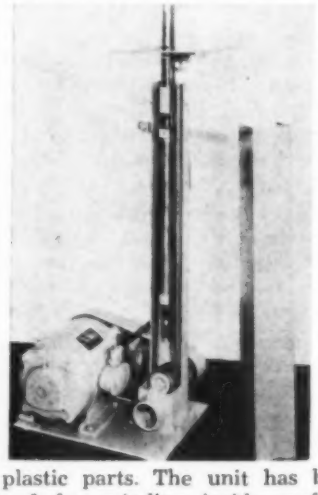
On individual requirements, the spindle design is available with tapered nose to accommodate the independent assembly of wheel holder with grinding wheel. The wheel holder with balancing weights assists in obtaining the ultimate in a precision grind.

The Standard Electrical Tool Co., 2488 River Rd., Cincinnati 4, Ohio.

Use postpaid card. Circle No. 105

Abrasive Belt Unit For Grinding Inside Surfaces

Shown with its protecting cover removed, the Model TS-90 uses a 90" belt in widths of 1" or 2", suitable for use on metal, wood or plastics for the removal of flash or parting lines on non-ferrous castings, moulded rubber



and plastic parts. The unit has been designed for grinding inside surfaces where clearance is a major factor, as well as to handle many small jobs.

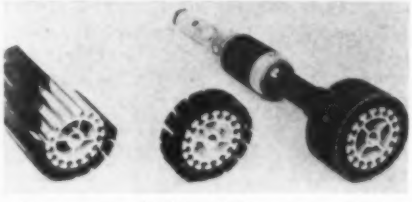
Platen and slack of belt grinding can be done on the standard model. A rubber covered contact wheel and adjustable tilting table are available accessories. It may be purchased with or without motor.

Grinding & Polishing Machinery Corp., 2530 Winthrop Ave., Indianapolis 5, Ind.

Use postpaid card. Circle No. 106

Grinding Wheels Offered In Widths to 8"

The Model 004, an addition to the line of Flexcore expanding-type grinding wheels, is 4" in diameter and offers complete flexibility of width selection.



The new lightweight core design made of extruded aluminum, facilitates the custom sizing of the individual wheels for specific uses. Concentricity is said to be extremely accurate for smooth, vibration-free operation. The wheel is reported able to retain the abrasive band at all times, with no bonding material needed.

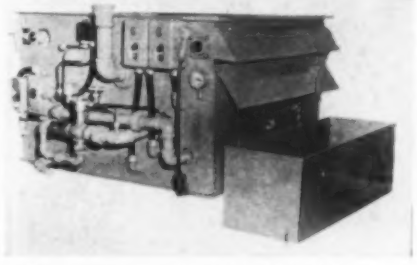
The wheels now include models with diameters of 3", 4", and 5" in a variety of widths and types of flexers.

Nu-Matic Grinders Inc., 8224 Carnegie Ave., Cleveland 3, Ohio.

Use postpaid card. Circle No. 107

Compact Filter and Conveyor Conserves on Floor Space

The Lundholm Manufacturing Co. announces their entry into the industrial filtration field with their combination filter and dragout conveyor type of filter. They have taken into consideration valuable floor space in designing this unit. It features a continuous or intermittent clean coolant automatic back-wash. Filtering medium consists of tubular screen rotating at the same speed of the conveyor system.



One pump and motor furnish clean coolant to machine or tool, at the same time furnishing clean coolant for backwashing. Filter sizes range from ten gpm and up.

Lundholm Manufacturing Co., 1121 Charles St., Rockford, Ill.

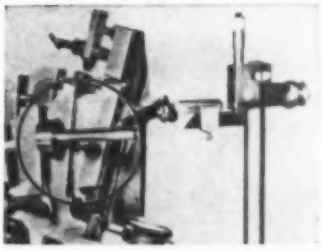
Use postpaid card. Circle No. 108

Small Cylinder Square Inspects Cramped Places

Powerful magnets in the cylindrical base of the square hold it securely to the part or object being checked. The small size of the cylinder square permits its use in cramped quarters and on relatively small finished surface. The checking surface is reported guaranteed square with base within 50-millionths of an inch.

The base has 1-7/16" diameter and checking surface is 4½" long. The price is $24.75, f.o.b. Detroit.

The illustration shows the square



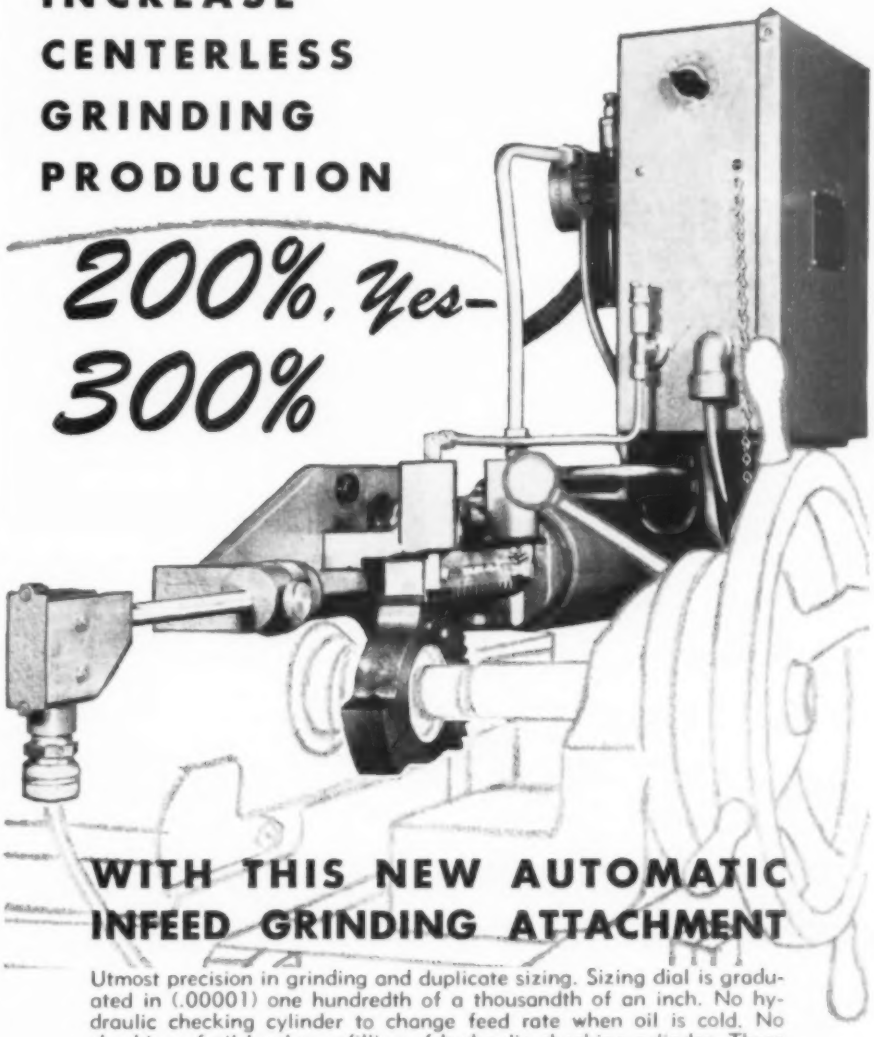
checking the alignment of components of a complex fixture mounted on a sine plate.

AA Gage Co., 350 Fair St., Detroit 20, Mich.

Use postpaid card. Circle No. 109

INCREASE CENTERLESS GRINDING PRODUCTION

200%, Yes— 300%



WITH THIS NEW AUTOMATIC INFEED GRINDING ATTACHMENT

Utmost precision in grinding and duplicate sizing. Sizing dial is graduated in (.00001) one hundredth of a thousandth of an inch. No hydraulic checking cylinder to change feed rate when oil is cold. No checking of oil level or refilling of hydraulic checking cylinder. Three (3) different feed rates are available in one unit for the fastest, most efficient, and precise sizing in a centerless grinder.

CAN BE USED FOR TRU-FEED AS WELL AS INFEED

for close sizing. Ideally located push button control station consists of Stop-Button, Start-Button, Caution Pilot Light, and a selector switch for set up or auto grinding positions. CATALOG Write for it today!

MODERN DEVICES

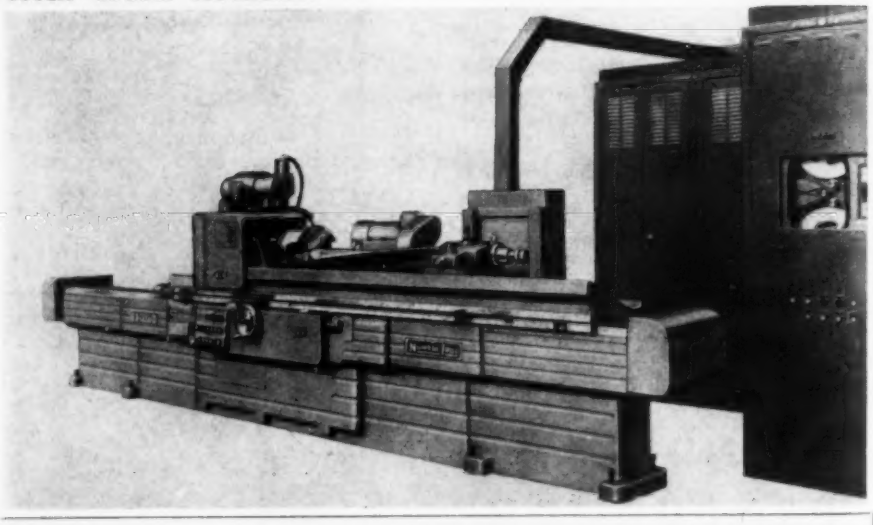
Subsidiary of TWENTIETH CENTURY MFG. CO.

FEEDCISION

Box 429 GF Libertyville, Illinois

Open Territories for Manufacturers' Representatives

Profiling Machines Apply Numerical Control With Work Rotation



Numeri-Trol profiling machines perform numerically controlled three-dimensional machining around the axis of the work. Equipped for milling and grinding operations, they are also the first numerically controlled machines in which grinding, dressing and dressing compensation are incorporated, according to the firm. All the instructions for the machining operations are recorded on tape. The length of time required to make the tape is dependent upon the complexity of the part. Parts of irregular and twisted forms can be machined.

Ex-Cell-O does not manufacture the control equipment, but designs and builds machines that can be operated from any high performance numerical control system. Of the first two profiling machines, one is operated by a magnetic tape system and electric servo motors, while the other uses punched tape and hydraulic servo motors.

Also, of the first two machines, the purpose of one is the production of steam turbine buckets in relatively small lots. It will handle a range of buckets up to 60" long and 11" wide. The other machine is intended for producing cams, templates and prototype jet engine blades.

Some of the advantages of these machines with numerical control are said to be shorter lead time, as prototype parts can be produced in a fraction of the time formerly required; quick change-over; elimination of costly handling and storage of tooling, and no lost time between various phases of work, as the rate of production is controlled by the tape.

Ex-Cello-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Use postpaid card. Circle No. 110

BREAK THE "PROFIT SQUEEZE" WITH BRIGHTBOY

Improve Your Product at Lower Cost

The unique working action of multi-use Brightboy (*abrasive and rubber functioning simultaneously*) produces a finish that frequently constitutes the final polish.

Brightboy is a STOCK line, made in a wide range of Silicon Carbide and Aluminum Oxide grains. Each in grades from extra fine to extra coarse, in soft, firm and tough rubber binders. The compound is in the rubber. *No muss! No fuss!*

Brightboy numbers are JOB-MATCHED to your finishing requirements; often take the place of "special" compounds; prove their versatility on regular and special finishing.

A Brightboy finish frequently constitutes the final polish, without necessitating an extra operation.

Made in WHEELS, STICKS, RODS & BLOCKS for machine and manual applications. Ask your dealer to recommend the Brightboy numbers for your needs, and for the Brightboy catalog listing applications and machine speeds. Write for "Notes From The Brightboy Service Engineer," describing Brightboy applications and uses.

Write for FREE SAMPLE
BRIGHTBOY HAND PIECE
for quick-job cleaning

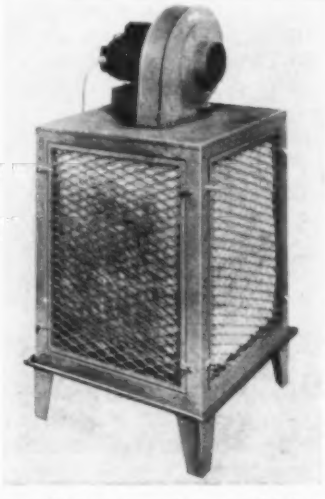
There Are Many
NEW APPLICATIONS
Never Before Associated With Finishing
FOR TODAY'S
RUBBER-CUSHIONED
ABRASIVES!
Replacing Costlier, Slower Methods

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
95 North 13th Street • Newark 7, N.J.
America's Pioneer Manufacturer of Rubber-Bonded Abrasives

WELDON ROBERTS
Brightboy
RUBBER CUSHIONED ABRASIVES

Mist Collector Protects Employee Health

The MC-412 is designed to control mists from wet machining operations that can endanger employee health or create fire and safety hazards. Only 22" square, it can be floor-mounted on legs or mounted on walls or ceiling.



The collector requires no high voltage electronic equipment, the company

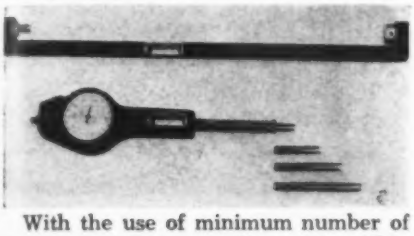
says, but filters mist and fog by passing the air through replaceable spun glass filters. The condensed coolant mist can be drained for re-use.

Torit Manufacturing Co., 292 Walnut St., St. Paul 1, Minn.

Use postpaid card. Circle No. 111

Dial Pin Gage and Master

A kit designed for checking large internal diameters contains an adjustable dial pin gage and master with 6" range.



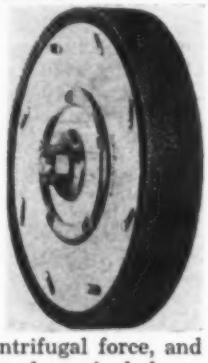
With the use of minimum number of range extensions, any dimension within the range of the gage can be set in a matter of minutes. The master is easily set with Jo blocks, and the gage in turn set with the master.

Individual gages and masters can be purchased if desired.

Boice Gages, Inc., Hyde Park, N.Y.

Use postpaid card. Circle No. 112

Grinding Wheel Has Rubber Disc And Abrasive Belt



An expanding wheel for circular abrasive belts is self-balancing and maintains a flat edge, so it can be used for polishing and tool grinding as well as rough deburring. The wheel has a floating action which frees it from edge distortion due to centrifugal force, and allows it to achieve dynamic balance in operation. Eight pins, equally spaced near the rim of the wheel and movable in their slots, permits freedom of wheel action.

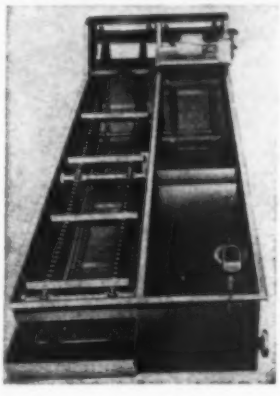
The No. 7125-1725 wheel can be used at speeds between 1250 and 2250 rpm, and No. 7125-3450 operates at 3450 rpm.

Miller Products Co., 1438 12th St., Box 325, N. Chicago, Ill.

Use postpaid card. Circle No. 113

Automatic Sludge Remover

A new design gravity clarification unit is reported to provide continuous, direct flow, controlled fluid velocity for the removal of metallic chips and abrasive particles. Removal of the particles and chips is achieved by a controlled flow velocity which is said to permit minimum turbulence and maximum time for gravity action. Filtering media is not used in the unit.



Flow capacities range from 20 to 1000 gpm with tank capacities from 140 to 7,600 gallons.

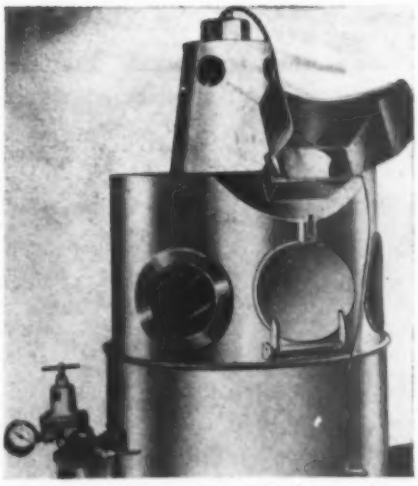
Delpark Div., Indiana Commercial Filters Corp., Lebanon, Ind.

Use postpaid card. Circle No. 114

Wet Blast Honer Fixes a True Edge

A true edge is said to be possible in using the Liqui-Breez wet blast honer, assuring longer tool life with greater operating efficiency. The honer is designed to save re-sharpening time, cut machine down-time and produce high quality finish de-burring.

The machine hones all types of tungsten-carbide and H.S.S. cutting tools



and drills. The operation of the machine requires an abrasive load of 5 lb. plus 3 lb. of water.

Tobin-Arp Manufacturing Co., 6400 Penn Ave. So., Minneapolis 23, Minn.

Use postpaid card. Circle No. 115

HOW TO CUT
SET-UP TIME
WITH
Sundstrand
Magnetic Chucks

Here are two more examples of the profitable application of Sundstrand magnetic chucks to grinding operations. Similar, profitable applications have been made to milling jobs.

No matter how you are holding work pieces now, in grinding and milling, talk to a Sundstrand engineer. There is no obligation for this service.

SET-UP TIME CUT 30%

12"x96" transverse pole magnetic table on vertical spindle grinder holds various sizes of H.S.S. broaching tools at an average savings in set-up time of 30% over former method.

SET-UP TIME CUT 20%

Four 10"x40" POWER-GRIP Chucks on a 24"x96" horizontal spindle surface grinder hold ways, way caps, valve plates, broach holders etc. The four chucks can be operated individually or as one complete unit. Set-up time averages 20% less than previous method.

GET MORE FACTS

Write for further information on holding work for both grinding and milling operations.

SUNDSTRAND
POWER-GRIP
SUNDSTRAND
MACHINE TOOL CO.
Magnetic Products Division
2531 ELEVENTH ST., ROCKFORD, ILLINOIS

Compact Bench-Model Ultrasonic Machine Tool

The Sheffield-Cavitron Model No. 200-B2 ultrasonic machine tool requires less than 2' x 4' of bench space, yet is capable of handling production as well as experimental machining of hard brittle materials. It has a machining area ranging from 1/64" to 1" in materials such as germanium, silicon, ferrite, hardened steel, and carbide. Typical ultrasonic machining operations include cutting, drilling, engraving, slicing, dicing, and the production of complex shapes and forms.

The machine utilizes a magnetostrictive transducer reported to provide up to 25,000 machining strokes per second. A signal light constantly monitors progress of the tool into the workpiece.

Vertical tool adjustment is 2", dial indicated. The tool, radially adjustable through 360°, is fed into the workpiece by manual control or by means of an adjustable gravity control.

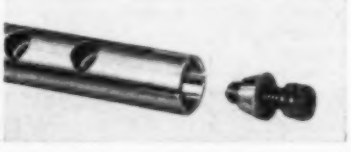
The Sheffield Corp., Dayton 1, Ohio.

Use postpaid card. Circle No. 116

WHY *Robbins* IS YOUR BEST BUY

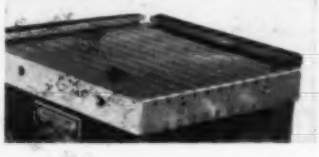
Only Robbins angular tooling equipment assures you positive accuracy when setting up to machine, grind or inspect angular work . . . because only Robbins gives you these exclusive features:

POSITIVE LOCKING locks firmly inside sine bar roll with expanding action for positive lock. Screw at each end locks toward front of unit, always pulls upper member firmly down on gage block without distortion. (Pat. app. for)



"PERMA-FLAT" SWIVEL BLOCK contacts gage block over entire face of swivel block instead of on a single thin line of contact. This patented feature provides greater contact between gage block and unit . . . combines with Robbins positive locking to assure the utmost accuracy.

FINE POLE ceramic magnet chuck, manufactured for Robbins by famed O.S. Walker Company, Inc. Strongest magnetic chuck available. Fine poles make it easier to set up smaller work, go right to the edge for easier setup next to rails.

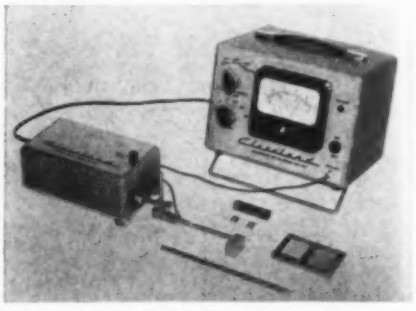


IN ADDITION, both magnetic and non-magnetic models are built with ribbed base, intermediate and top plates for distortion-free strength and rigidity, with full-length ground roll seats for precision location, greater accuracy. All models make it possible to set up any angular work in just four simple steps . . . in minutes instead of hours! Before you purchase any sine plate, be sure you check Robbins' exclusive features. Write for new catalog!

OMER E. Robbins COMPANY
11961 DIXIE AVENUE DEPT. G DETROIT 39, MICH.

Roughness Meter Needs No Added Accessories

The Cleveland roughness meter is said to measure a wide range of surface



shapes (outside diameters down to .030", inside down to .25) with no additional adaptors or accessories required.

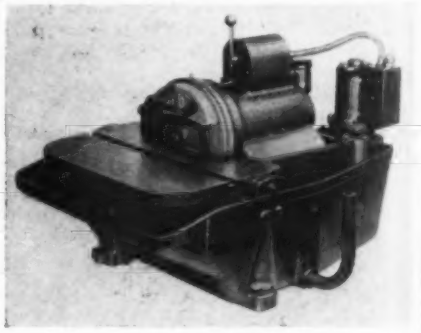
The basic meter consists of pick-up, amplifier, and handle. It may be operated hand held or with power trace. Temperature, humidity and/or magnetic fields do not affect readings.

Cleveland Instrument Co., 735 Carnegie Ave., Cleveland 15, Ohio.

Use postpaid card. Circle No. 117

Grinding & Lapping Machine Has Automatic Oscillating Head

The GF-O bench type oscillating grinding and lapping machine, developed for use with Wickman steel bonded diamond wheel, features a specially designed reversible guard to give maximum access to the wheel. Both right- and left-hand tools can be lapped efficiently.



Another feature is the automatic oscillating motion of the head. The operator need only hold the tool firmly on the table and press gently on the cutting face of the diamond wheel to produce a perfectly straight edge at whatever rake is required, according to the report. Operator fatigue is eliminated.

The machine is equipped with a 1 hp motor rotating at 2850 rpm. It is

a direct drive, the wheel mounting flange being fitted with a taper to the end of the motor spindle.

Wickman Manufacturing Co., 10325 Capital Ave., Oak Park (Detroit 37), Mich.

Use postpaid card. Circle No. 118

Felts For Reverse Jet Air Filtration Media

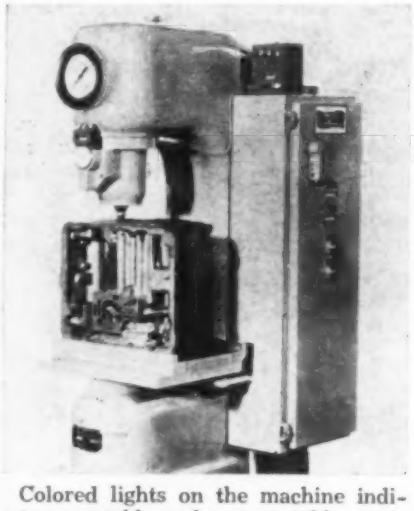
Two felts, one made of Dacron and the other of Orlon, are said to be ideal because they offer dimensional stability (less than 2½% shrinkage), good abrasion resistance, and uniform air flow in their use in reverse jet air filtration media. The filtration felts are variations of American's Feutron series of felts.

Samples of these felts and a data card giving specifications may be obtained by writing the American Felt Co., Glenville, Conn.

Use postpaid card. Circle No. 119

Tester Uses Interlocking Part Positioner

The Brinell hardness tester developed by the manufacturer determines the workpiece position before it can operate. A precision limit switch located in the table fixture must be depressed by the part before the knee-actuated cycle-switch becomes energized.



Colored lights on the machine indicate acceptable and unacceptable parts. Counters keep a record of each. A gage on the front of the machine is periodically used to check the adjustable hydraulically applied load.

Throat depth of the machine is 10", the maximum vertical opening is 14", and loads from 500 to 3000 kg can be applied.

Steel City Testing Machines, Inc., 8817 Lyndon Ave., Detroit 38, Mich.

Use postpaid card. Circle No. 120

Capsule-Size Mercury Switch

A small mercury switch, weighing only 1.8 grams with leads, is reported to offer sensitive, trouble-free operation. It is designed for computers, electronic organs and other devices using minimum operating energy and limited space.

The AS419A1 switch may be mounted in any position through 360° around its longitudinal axis. Contact arrangement is single-pole single-throw.

The switch is electrically rated for a resistive load of 1 amp., 30 volts ac or dc, .5 amp., 110 vac or .75 amp., 110 vdc. On inductive loads it is rated at .75 amp., 30 volts ac or dc with inrush at 2½ times full load.

Micro Switch, Div. Minneapolis-Honeywell Regulator Co., Freeport, Ill.

Use postpaid card. Circle No. 121

Barrel Finishing Machine

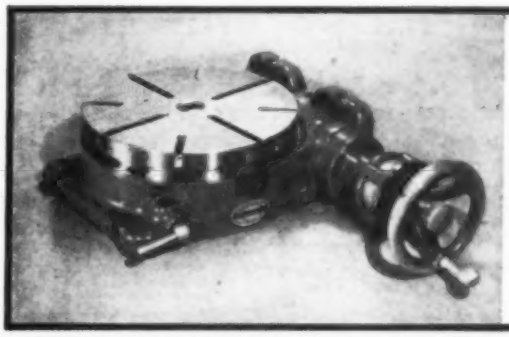
The barrel finishing machine incorporates a one-piece pressure molded rubber barrel, driven on rollers. There are no joints or crevices in which particles of abrasive might wedge, contaminating subsequent operations. The barrels can be used for deburring, descaling, polishing, radiusing, grinding, and burnishing.

The aluminum barrel cover is quickly detachable. When the handle is locked in position, the barrel is water-tight. There is an advantage to having an extra barrel.

Globe Barrel Finishing Equipment Div., Casalbi Co., 540 Wayne St., Jackson, Mich.

Use postpaid card. Circle No. 122

For angular spacing jobs so precise you could never handle them before



A Rotary Table accurate to ± 3 sec. in 360° (USING CHART)

No. 2 Moore 11-Inch Rotary Table, *developed by the builder of the Jig Borer and Jig Grinder.*

THE FOLLOWING ACCURACY BUILT FOR SHOP USE:

All points in 90° increments, from zero, ± 1½ sec.
All points in 18° increments, from zero, ± 2 sec.
All points in 2° increments, from zero, ± 4 sec.
Worm accuracy, ± 1 sec.
Repetition of settings, ± 1 sec.
4 sec. = .0001" on 10" dia.

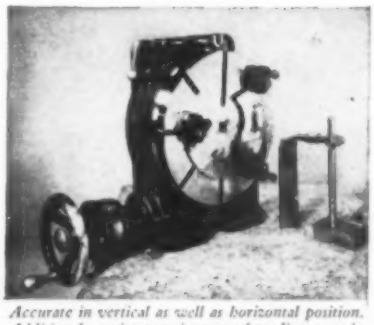
How many jobs have slipped by you because the angular spacing requirements were just too much for your equipment?

With Moore's new 11-Inch Rotary Table, you can easily handle the most precise angular measurements. Having an overall performance accuracy of ± 6 seconds throughout the entire 360°, this table is already being used successfully by several leading companies on government-sponsored precision jobs never before accomplished.

This extreme accuracy is achieved by a non-disengagable, thread-ground worm, combined with accurately spaced teeth of its mating gear. An ultra-sensitive method of angular measurement—interferometric inspection and calibration—used industrially for the first time, assures tooth spacing accuracy within less than ± 4 seconds.

You can use this rotary table for countless precision spacing applications on jig borers and jig grinders. Examples: Spacing holes in a circle on either machine; set at right angle for additional machining and inspection jobs; with its companion unit, the new No. 2 Sine Plate, to produce compound angle settings. Write today for Bulletin RT2.

MOORE SPECIAL TOOL COMPANY, INC.
732 Union Avenue, Bridgeport 7, Connecticut



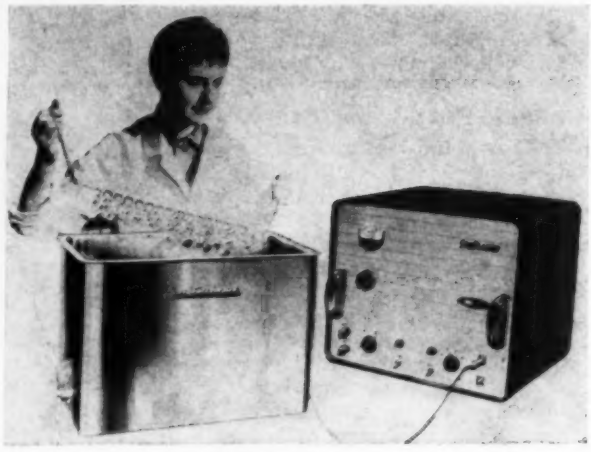
Accurate in vertical as well as horizontal position. Additional vernier permits normal reading even in vertical position.

Accuracy assured by interferometric inspection and calibration. This is the first time industry has used light-wave measuring methods for precise division of the circle.

ADD MOORE TOOLS (SPEED • ACCURACY) TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

Ultrasonic Cleaner For Large-Volume Cleaning



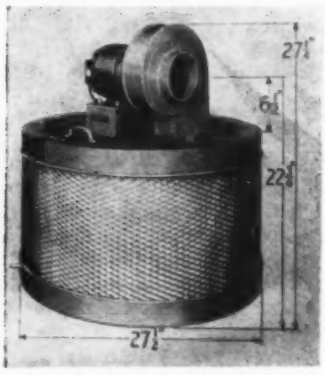
The Series 5000 Narda SonBlaster features a generator with full 500 watts output and a fully transducerized 10-gallon tank. The generator is equipped with tank selector and load selector switches so that it can operate either one or two ultrasonic tanks separately, or submersible transducers in tanks up to 30-gallons capacity.

The ultrasonic cleaner will be shown publicly for the first time at the National Metal Exposition, in Cleveland, October 27-31.

The Narda Ultrasonics Corp., 625 Main St., Westbury, L.I., N.Y.

Use postpaid card. Circle No. 123

Safety Aluminum Fan Added To Mist-Fog Collectors



Non-magnetic, spark-proof fans, now included in the Mistkop models, cannot possibly attract metal fragments or give off sparks in the event of accidental contact, according to the announcement. This is important in reducing the danger from vapors of a combustible or explosive nature.

The collectors, consisting of a fan, filter and condensate element, are reported as fireproof. They have suction capacities from 600 to 3600 cfm.

Illustrated is the Model VCS-2.

Aget Manufacturing Co., Adrian, Mich.

Use postpaid card. Circle No. 124

Band Saw Sharpener

An attachment developed for the manufacturer's saw sharpening machine automatically sharpens band saw blades. The rack for holding the band saw blade is constructed so it can be extended in a horizontal or a vertical position.

By relocating the back guide bar, the guide table will accept blades from ¾" to 2" in width. The guide table is adjustable by pivoting so any desired hook may be put in the teeth. The secondary stroke adjustment allows the tooth being ground to be fed without damage to the tooth. The feed finger keeps the blade properly positioned for grinding back against a guide bar.

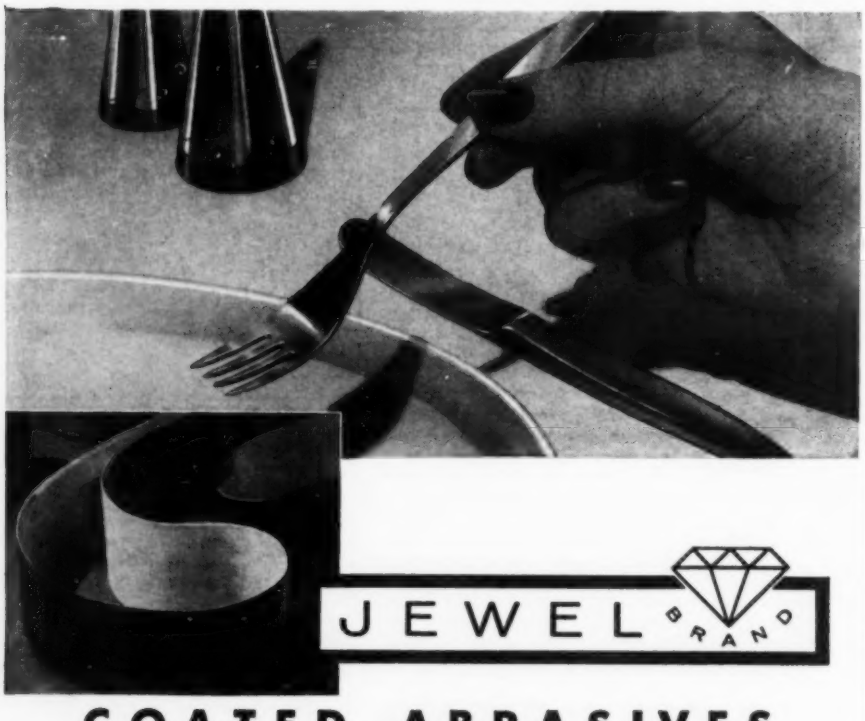
The machine may be used on all types of materials, such as steel, brass, copper, bronze, aluminum, plastics, paper, and wood.

Hamco Machines, Inc., 99 Mt. Hope Ave., Rochester 20, N.Y.

Use postpaid card. Circle No. 125

For the finishing touch that means so much!

From the smooth feel of perfectly polished stainless steel tableware to the contoured grips on modern power tools, Jewel Brand Coated Abrasives are bringing fast, efficient grinding, smoothing and polishing to the manufacture of hundreds of products. Because *end products cost less when you finish with Jewel Brand Abrasives*, it will pay you to bring their many advantages to bear on your finishing problems. Order now from your Industrial Distributor or write for specific recommendations.



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ABRASIVE PRODUCTS, INC.

South Braintree 85, Massachusetts

Flexible Mask Goggle

The improved 482A features a larger and deeper mask resulting in a greater area of protection. It easily fits over all types of personal and safety Rx glasses. The mask is made of soft flexible vinylite and easily conforms to facial contours. The lens is easily removed and replaced.

American Optical Co., Safety Products Div., Southbridge, Mass.

Use postpaid card. Circle No. 126

Rotary Conveyor For Polishing Head Units

The Model RJ rotary dial conveyor, for use with polishing, buffing and brushing head units on automatic installations, consists of a heavy welded steel base, cylindrical in the main section, into which is mounted the complete dial and work spindle driving mechanism. A louvre door at the lower front of the base provides easy access to the dial drive motor, fixture drive motor and mechanism within.

The mechanism consists of a gear reduction and variable speed drive for the dial plate, which includes an intermittent motion for indexing the dial. The gear reduction unit, variable speed drive, and chain and sprocket assembly for rotating the six fixture spindles are also included in the base.

A separate Podium mounted push-button panel provides mounting for P/B stations which operate all motor controls.

The work holding dial is provided with six ball bearing mounted fixture spindles of 1½" diameter x 3". The dial index rate is adjustable from 120 to 1800 indexes per hour with the fixture spindle speed adjustable from 12 to 100 rpm. Other speeds are also available.

A similar model is also available for applications where a continuous dial motion will be more suitable than the indexing type.

Divine Brothers Co., Seward Ave., Utica, N.Y.

Use postpaid card. Circle No. 127

Sand Blaster Removes Paint, Rust, Weld Scale

The Sandy Jet "Spot" Blaster is reported to quickly and easily clean rust, paint, carbon, dirt, and weld scale—right down to bare metal—from moldings, seams, corners, blind spots, and engine parts.

The blaster operates on an average garage compressor at 100 to 180 lbs pressure. No separate blast room is required. The tank holds 12 qts. of abrasives. Liquid detergents may be used for cleaning the engine and parts.

The unit sells complete, with extra blast nozzle, at $29.95.

A.L.C. Co., 646 Oak St., Medina, Ohio.

Use postpaid card. Circle No. 128

WITH BETTER PROFITS KRAMER FINISHING EQUIPMENT

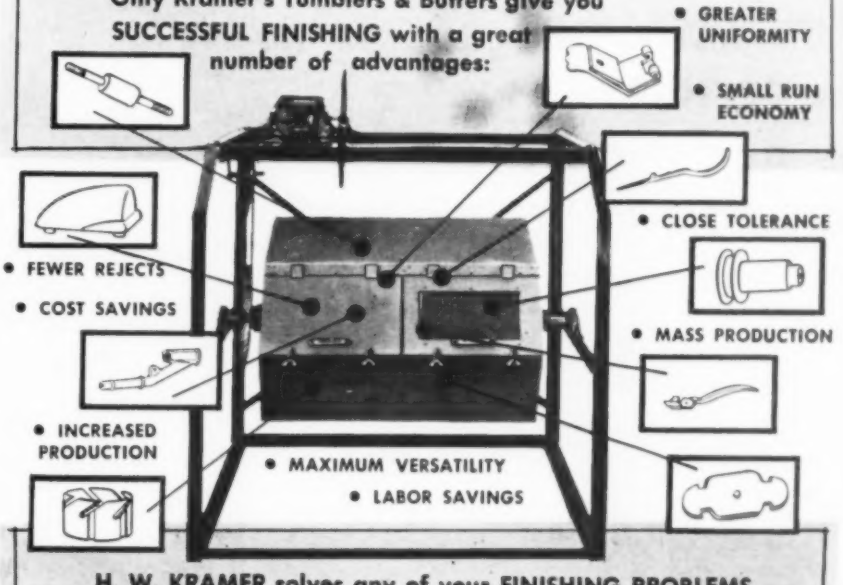
Development of New Methods Cuts Costs!

The greatest money-saving opportunities in Metal Finishing is yours now . . . in the use of H. W. KRAMER barrel Finishing!

Now, you can finish parts by the hundreds instead of the conventional methods that finish 1 part at the time. It's real easy work . . . it's childs play!

SAMPLE PARTS PROCESSED and a SPECIFICATION SHEET SUPPLIED TO THE MANUFACTURER.

Only Kramer's Tumblers & Buffers give you SUCCESSFUL FINISHING with a great number of advantages:



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FLORIDA REPRESENTATIVE
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5541 NW 37th Avenue
Miami, Fla.

Kit For Super Sharpening Carbide Cutting Tools

The tool room kit contains a 6" magnetic chuck, single layer diamond grinding wheel ring, diamond ring lap attachment, diamond lapping compound, roller, diamond lapping oil, thinner, atomizer oil applicator, and diamond wheel dressing stick.

The magnetic chuck, which can be used with Pensco single layer, triple layer or impregnated diamond grinding rings, is adaptable to all 6" carbide tool grinders. It holds diamond grinding rings securely and permits simple changing of the rings. The rings are in various grit sizes, and snap into place readily. They are said to be almost indestructible.

Penn Scientific Products Corp., Abington, Pa.

Use postpaid card. Circle No. 129

AMERICAN LIP CORPORATION

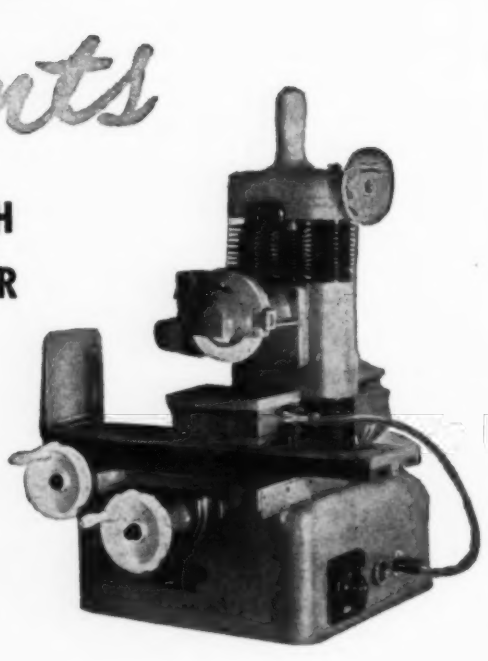
Presents

PRECISION BENCH SURFACE GRINDER

★ EFFICIENT

★ ACCURATE

★ VERSATILE



This compactly designed surface grinder is especially adapted for the precision dry grinding of small parts: dies, tools, gauges and instrument components. The low-cost LIP surface grinder permits the spot use of a number of machines strategically located throughout the plant. Features: Automatic spindle play take-up; precision ball bearings, counter balanced grinding wheel, bellows for dust protection, built in demagnetizer; magnetic chuck surface, 4⅛"x6"; longitudinal stroke of table, 8"; cross stroke, 4¼". Grinder is supplied complete with a 1/3 H. P. 220 volt or 110 volt ball bearing motor.

Representatives note: Several Exclusive Territories Available.

FOR LITERATURE AND PRICES WRITE TO:

AMERICAN LIP CORPORATION

Tel.: Circle 6-0088

610 Fifth Ave. New York 20, N. Y.

New Line of Air Gaging Capsules

The air capsule is a small, air-actuated pick-up of the direct contact type. It is used with any Taft-Peirce

CompAIRator air gage for fast visual readout with quick response. Extreme accuracy is said to be possible because of the high magnifications available in the CompAIRator. The air capsule is available in a long-range model designed for wide tolerance gaging, having a range of .004" to .040".

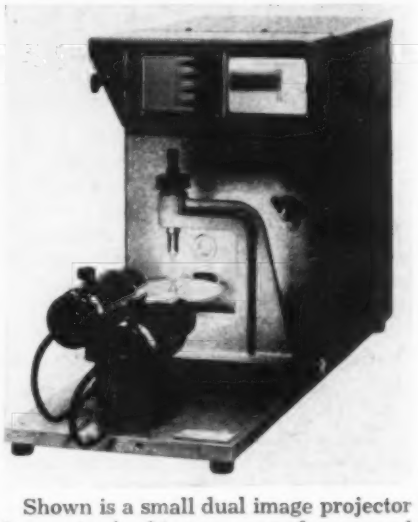
The air capsule comes in both plain and threaded body types and measures only 1½" long x .375" diameter. Using simple attachments, the plain body capsule may easily be clamped on height gages and surface gages.

The Taft-Peirce Mfg. Co., Woonsocket, R.I.

Use postpaid card. Circle No. 130

Dual Image Comparator Eliminates Resetting Part

The dual image projector gives two simultaneous images through separate optical systems for coordinate checking. Effects in one plane are shown in the second. This eliminates resetting the part and repeating adjustments.



Shown is a small dual image projector for use in checking run-out of worm and disc assemblies for watt-hour meters. Magnifications here are alike for both images. Screen size is purposely reduced to include only the best features in question.

The optical systems are designed for the customer's specific job. They may be of different magnifications and focal lengths.

Screens to accommodate magnifica-

ions and part sizes range from 3" x 3" square to 20" diameter, with separate screens for each view or both images appearing on a single screen.

Stocker & Yale, Marblehead, Mass.

Use postpaid card. Circle No. 131

Face Shield

The Welsh Trojan face shield has simple ratchet adjustment to easily adjust to any head size. Clear or green acetate windows come in 4", 6" or 8" lengths, and in .020 and .040 thickness.

Welsh Manufacturing Co., 24 Magnolia St., Providence, R.I.

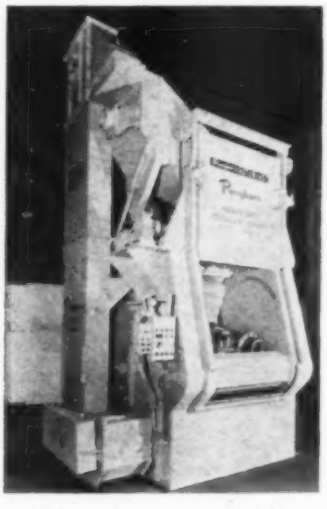
Use postpaid card. Circle No. 132

Blast Cleaning Barrel Allows Loads to 3500 Lb.

The Type 20 GN Rotoblast barrel has a 30 hp motor, which is said to allow the 195-3 RG wheel to throw 50,000 lb. of abrasive per hour for rapid blast cleaning, replacing the 15 hp motor used on the standard 18 cu. ft. Blastmaster. The new, extra-heavy work conveyor allows loads up to 3500 lb. with single pieces weighing up to 800 lb. each to be handled, according to the firm.

When the barrel is operating, the conveyor travels upward to tumble the castings. After the cleaning operation, direction of the conveyor is reversed and the load is discharged. The conveyor take-up is located on the bottom shaft where weight of the conveyor makes it easier to adjust.

Abrasive-tight doors and housing retain abrasive in the machine and permit economical use of new types of abrasives.



A quick-acting work loader, with double cables for safety, delivers each batch into the machine. A control panel is conveniently located, and push buttons are used.

The barrel is 8'5" deep by 11'10" wide and 16' 11⅜" high.

Pangborn Corp., Hagerstown, Md.

Use postpaid card. Circle No. 133

Extension Height Block Permits Height & Reach Measurements

The extension height block makes it possible to move inspection equipment (height gage and indicator, for example) closer to the workpiece, eliminating excessive extension arm lengths. This gives better control of measuring devices and allows more accurate measurements in hard-to-reach places.

The block's over-all height is 10", + or —.0005. Ample clamping surfaces are provided. Sizes in addition to the standard 10" model are also available.

Machine Products Corp., 6771 McNichols Rd., Detroit 12, Mich.

Use postpaid card. Circle No. 134

Sensational NEW COSMO C-57 CONTACT WHEEL

AVAILABLE IN THE NEW WONDER MATERIAL URETHANE RUBBER

Industry Reports up to 15 TIMES LONGER WHEEL LIFE

because of greater resistance to abrasion

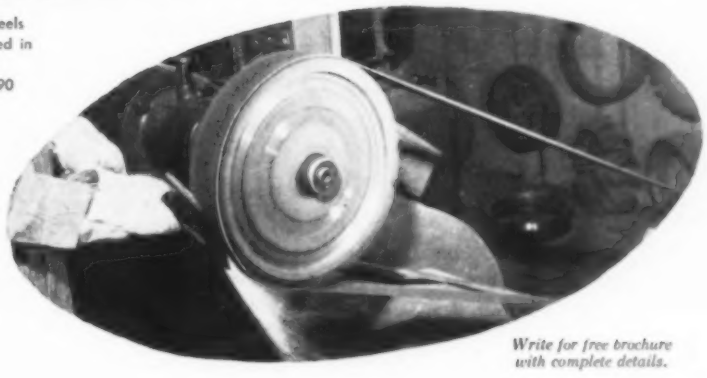
FASTER CUTTING . . .
Expertly designed serrations for greater flexibility . . . covers more area with each pass.

PROMOTES AND CONTROLS SHELLING . . .
prevents abrasive belt glazing.

RESISTANT TO OIL, SOLVENTS AND HEAT DETERIORATION

Increase Your Belt Life Grind and Polish Faster at Less Cost with the new sensational COSMO C-57

Urethane Rubber Wheels Manufactured in Durometers from 60 to 90



Write for free brochure with complete details.

CHICAGO RUBBER COMPANY, INC.

660 Market Street • Waukegan, Illinois

Split Drum Sander Uses Low Cost Coated Abrasive Strips

The Hargreaves split drum sander, using low cost strips of coated abrasives, has no hinge to crack or break

under high speed. The locking cone is a part of the arbor bushing. The necessity for a backing flange has been eliminated, although one is included with the sander. If it were accidentally left off the assembly, however, no damage would result as long as the wheel is tight against a shoulder on the arbor spindle.

The sander is available in 6" diameter sizes (widths of 1", 1½", 3", and 4"). Other diameters, 3" through 12", will be available in the future.

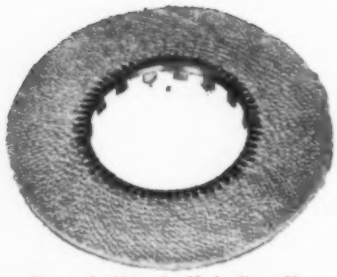
Hargreaves Industrial, 120 N.W. Ninth Ave., Portland 9, Ore.

Use postpaid card. Circle No. 135

Treatment For Cotton Or Sisal Buff

The Black Treatment can make any cotton or sisal buff tougher, longer-lasting, and more efficient, according to the firm. This treatment, with its "tacky" texture, bonds fibers firmly together, eliminates fraying, and improves cut and color.

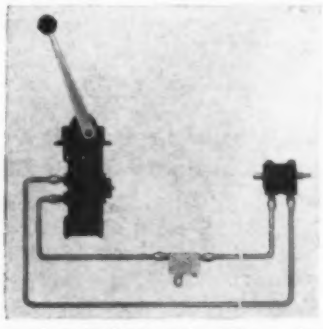
American Buff Co., 2414 S. LaSalle St., Chicago 16, Ill.



Use postpaid card. Circle No. 136

Remote Control Slave Unit Has Thrust Cap. to 1000 Lb.

A low-cost, straight-line slave unit has 1" length of stroke with 1000 lb. thrust capacity. The body measures 2¾"



high and 1-15/16" wide. The unit may be easily connected to governors, throttles, clutches and similar devices for remote control or positioning purposes.

The self-contained hydraulic system incorporates a filler-bleeder fitting which eliminates the need for accessory pressure equipment.

The Hydronic Co., 12685 Arnold Ave., Detroit 39, Mich.

Use postpaid card. Circle No. 137

V-Band Couplings Speed Screen Change

The Marman stainless steel V-band couplings lock and seal from one to three screens on each vibrating sepa-

rator used at Southwestern Engineering Co. of Los Angeles. Arrow in picture points out a coupling which connects and disconnects speedily. Frames may easily be released to change screen cloths, it is reported.

The couplings are available in various sizes and cross sections.

Marman Div., Aeroquip Corp., 11214 Exposition Blvd., Los Angeles 64, Calif.

Use postpaid card. Circle No. 138

Card With Film Blank Speeds Drawing Reference

Technique developed for reference or manual reproduction of copies of engi-

AT STANDARD WE'RE IN IT

UP TO OUR EARS!

IN THIS NEW FIELD, STANDARD SUPER PRECISION SPINDLES ARE FINISHING DOZENS OF HARD METALS!

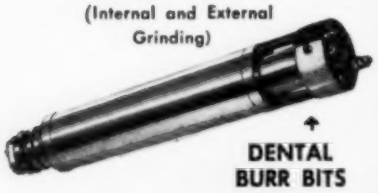
FASTER — CUTS MACHINING TIME

PRODUCES A FINER FINISH

ELIMINATES HEAT-DISTORTION

REDUCES WHEEL COST UP TO 90%

AIRCRAFT PARTS (Internal and External Grinding)



DENTAL BURR BITS

HYPODERMIC NEEDLES

A leading designer in this NEW field says: "A solid, true and smooth running spindle is essential for good results . . ."

THAT'S WHERE STANDARD SUPER PRECISION SPINDLES COME IN . . . Standard of the industry for accuracy, vibrationless operation and long life.

Write today for full information on THE ELECTROLYTIC GRINDING PROBLEMS WE'VE HELPED SOLVE . . . we'll work with you on yours. 75 to 3000 Amperes.

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the STANDARD electrical tool co.

PRECISION SPINDLE DIVISION

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BOOTH 128 WESTERN TOOL SHOW Los Angeles Sept. 29-Oct. 3

neering drawings and records makes use of the REF Duplicard with a piece of diazo film mounted in its microfilm aperture. Card and film are priced at 3¾c complete.

When a drawing is required, the engineer writes the drawing number, his name and department number on the blank card. The clerk takes the card and pulls the master aperture card with its microfilmed drawing. Using a microfilm diazo printer, she reproduces the drawing image onto the Duplicard. The master aperture card can then be returned immediately to the files. The Duplicard becomes a printed card which can be discarded after reference or reproduction.

The Filmsort Co., Div. of Miehle-Goss-Dexter, Inc., Pearl River, N.Y.

Use postpaid card. Circle No. 139

Handle Bolt Allows Easy Handle Adjustment

The Speedeelok handle bolt has been developed by The Kent Co., Inc., for all its floor machines, including the new K-12 model. The handle bolt permits easy adjustment from vertical to horizontal of the handle on the machines. A wrench or other tools are not needed.

The assembly retails for $1.95.

The Kent Co., Inc., Canal St., Rome, N.Y.

Use postpaid card. Circle No. 140

Air Blow Gun Has Balanced Piston Action

The gun provides the operator a natural and comfortable grip. A slight finger pressure on the trigger operates a cam action mechanism permitting easy control in directing the air stream.

Ten inch length extension nozzles in straight and curved end design, are available for hard-to-get-at places.

The blow gun is priced at $2.95. The straight nozzle is $1.10, with the curved one at $1.20.

Breco, Div. of Perfecting Service Co., 332 Atando Ave., Charlotte 6, N.C.

Use postpaid card. Circle No. 141

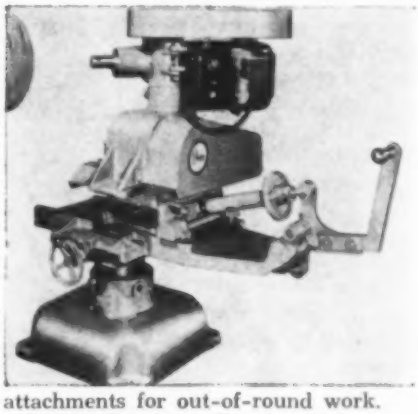
Buffing Machine Adjusts Stroke Up to 12"

The PG Semi-Matic work holder has stroke adjustable to 12" maximum, so work can easily be buffed wider than the face of the wheel. Adjustments for spindle height, tilting up or down to 15°, cross traverse, wheel wear, and spindle swivel are provided.

The unit is reported easy to change over for new jobs. Three spindle speeds provide the correct spindle and stroke speed for any work diameter. Spindle rotation may be reversed if desired.

The work holder holds the work against the wheel, turning it and oscillating it across the wheel. The operator loads the work, advances it to the wheel, and the machine does the rest.

The buffing machine may be converted to a two-spindle work holder with a Divine K2 Head. Other attachments include geared chucks and cam



attachments for out-of-round work.

Divine Brothers Co., Seward Ave., Utica, N.Y.

Use postpaid card. Circle No. 142

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Cut your costs - increase your performance
with VSM - COATED ABRASIVES
For almost 100 years a leading supplier to Europe's Industry. During the few years that VSM Coated Abrasives are available in the U.S. Market they have found enthusiastic acceptance for,
FAST CUTTING ACTION
SMOOTH SURFACE AND CONTOUR SANDING
FINE FINISHES
AT TRULY MONEY SAVING PRICES
VSM Coated Abrasives in BELTS, ROLLS, DISCS and SHEETS
Sole U.S. Factory Representatives
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Abrasive Sales Division
145 Nassau Street - New York 38, N. Y.
Some interesting territories still open for Distributors

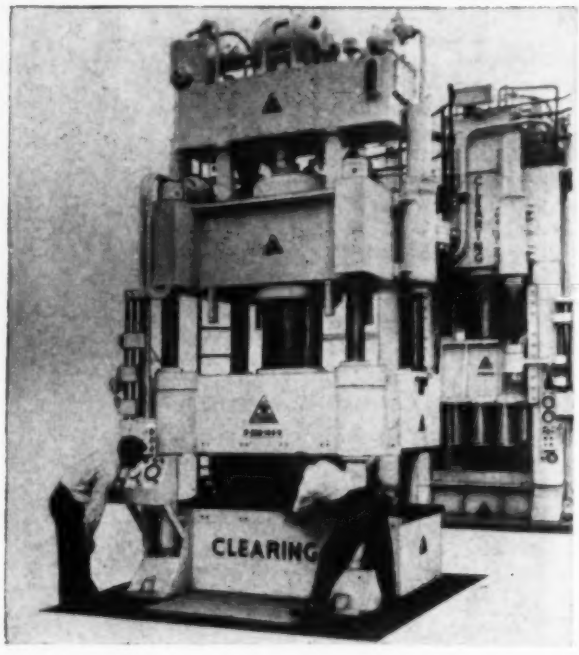
wherever abrasive operations are performed

News of Industry

Edson Tool Buys Clearing Presses For Contracting

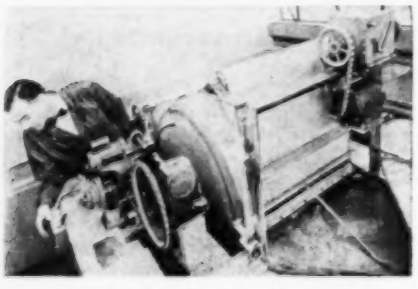
Shown are two 500-ton Clearing Machine presses recently installed by the Edson Tool & Manufacturing Co., Belleville, N.J., for use in contract manufacturing. The hydraulic presses are designed especially for precision deep drawing and give the company the capacity for working blanks up to ½" in thickness, and 48" x 120" in area.

The machines are described as the only non-captive presses of their size available for custom fabrication work in the mid-Atlantic coastal area.



Asarco Develops Process To Make Zinc Foil

A new, continuous process to produce zinc as a thin foil has been developed by American Smelting and Refining Co., at its Central Research Laboratory, South Plainfield, N.J. A pilot plant unit is now turning out developmental



quantities of the foil in sheets ranging from 0.005" to 0.001" in thickness, and 26" in width. Asarco is now considering the installation of a larger scale pilot unit at its Corpus Christi, Texas, plant.

A foil of high chemical purity is said to be produced, with good ductility and tensile strength, for certain electrical applications. The low-priced zinc foil is reported to be easily soldered, and it can be printed on.

46th National Safety Congress and Exposition

The 46th National Safety Congress and Exposition, sponsored by the National Safety Council, meets in Chicago October 20-24, with the majority of the sessions being scheduled for the Conrad Hilton Hotel.

A number of the sessions appear to have a bearing on problems of safety in the use of abrasives, though there is no section specifically concerned with this subject.

Suggested for consideration are the following:

"Planning Safety into Automation" Thomas E. Seavey, Master Mechanic, GM's Pontiac Motor Division (Mechanical Engineering and Safety Section, 10:45 a.m. Wednesday, Gold Room, Second Floor, Congress Hotel).

"Modern Concepts of Safeguarding Machine Operations" L. A. Faulkner, Supervisor, Industrial Plant Service, Loss Prevention Dept., Liberty Mutual Insurance Co. (Automotive and Machine Shop Section, 3:30 p.m. Thursday, Florentine Room, Third Floor, Congress Hotel).

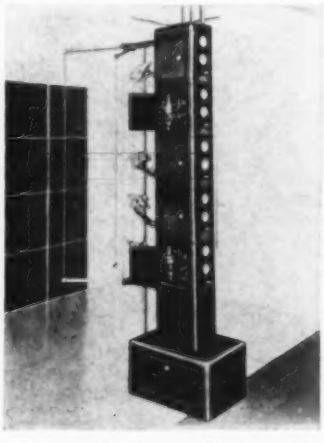
Metals Section. Illustrated address by John A. Peloubet, Safety Engineer, Magnesium Department, Dow Chemical Co. (2:30 p.m. Tuesday, Private Dining Room No. 4, Third Floor, Conrad Hilton Hotel).

"Safe Operation of Banbury Mixers" A. S. MacLeod, Engineering Dept., U. S. Rubber Co. (Rubber Section, 2:30 p.m. Monday, Williford Room, Parlor C, Third Floor, Conrad Hilton Hotel).

A great many addresses and section meetings bear on the general problems of safety attitudes and similar problems, which are as applicable in abrasives as they are in other industries.

Binks Spray Painting Units At Metal Show, Oct. 27-31

The Binks Manufacturing Co., Chicago, will display some of its latest



products at the National Metal Show and Congress, Oct. 27-31, in Cleveland. Included in the display will be the new Binks Modular Electrostatic spray painting units, rotary automatic spray painting equipment with electric timers and conveyor, a new paint heater and Kayo and Pogo series paint pumps delivering paint at a 2 to 4-1 ratio.

"Easy Accuracy"

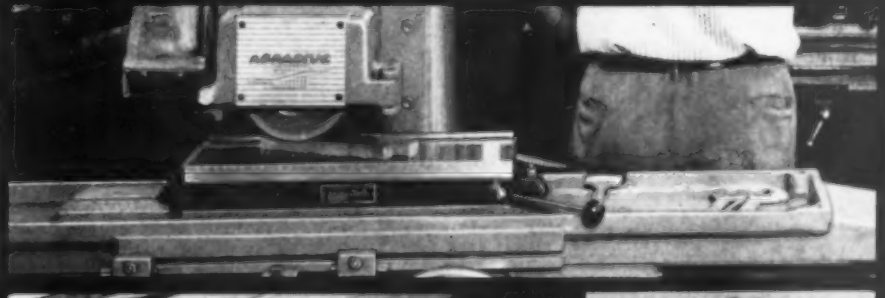
That's what one Big Cleveland Gage Maker says about

ABRASIVE SIX EIGHTEEN

Hand Feed Precision Surface Grinders

"Our new 618's", reports Bob Pringle, General Manager of Winslow Manufacturing, Cleveland, "are what we've needed to help us stay on top as the **first name in precision control.**" With Abrasive's modern design and 'operator engineered' features, the story is the same in precision shops all over the country.

At Winslow, "the feature which most impressed our employees is the fast table travel. This makes it much easier to grind hardened material." And well it should! The 618 rides smoothly on precision anti-friction rollers. It is actuated by a smooth cable and drum drive. You get 6" of table movement with each turn of the 8" handwheel .



Bob Pringle goes on to report, "we have used the machine primarily for gage work and find that the finish is very good. It's excellent for side grinding, too." Heavy, rugged, deeply-ribbed construction plus the advantages in Abrasive's motorized spindle and wheelhead assembly make high finishes easy.

Precision and efficiency are vital at Winslow, and they found "the good repeatability of the 618 dial settings to be of special advantage." All operators appreciate the comfortable, balanced feel of the smooth recessed handwheels, available either right or left-handed. They like the comfort and convenience of the controls all located on the same waist-high plane.

It makes good sense for you, too, to look into the many profit-producing advantages of the new Abrasive 618's. Without obligation our colorful eight-page tell-all brochure is yours. **Write for it, today!**

ABRASIVE MACHINE TOOL COMPANY

Dexter Road
East Providence 14, Rhode Island

ABRASIVE

The Cleveland Instrument Company, Cleveland, expect to be in their new building, shown here, at 6220 East Schaaf Rd., early in November. The expanded space is needed by their fast-growing business in the manufacture of precision measuring instruments.

No Whistling In the Dark For Machinery Manufacturers

Business Week surveyed dozens of machinery companies on how the sales curve is going and found that "mounting orders have changed glumness to a temperate optimism . . ."

"Of the five major groups of the industry, the makers of pumps and compressors are leading the upward turn. Behind them come the makers of motors and generators, of mining machinery and of machine tools. Even in last place—oil field machinery and tools—there is little discouragement."

Chicago area steelmen say orders from machinery makers are the highest in more than a year.

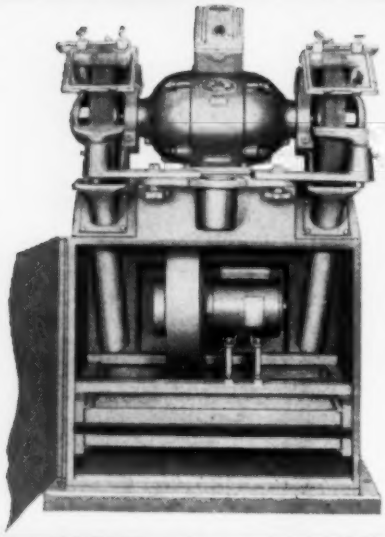
Purchasing Agents Hold Workshop Oct. 21-22, 1958

The Purchasing Agents Association of Chicago, associated with the National Association of Purchasing Agents, will again hold its two-day Purchasing Workshop on October 21-22, 1958.

Outstanding discussion leaders have been engaged. Subjects covered will be: inventory control, value analysis, measuring purchasing performance, internal departmental relationship, data processing, to name a few.

Registration blanks may be obtained by contacting the Purchasing Agents Association of Chicago, 134 N. LaSalle St., Chicago 2, Ill. The phone number is STate 2-1940.

NEW 2-in-1 GENERAL PURPOSE GRINDER
with Built-in DUST COLLECTOR



Compact...
Efficient...
Space-Saving
Model 504
1, 2, 3 and 5 H.P. TYPES
Fits neatly into your plant layout without waste space . . . entire unit only 32½ inches wide and 20 inches deep.

Over 60 Years of Service to Industry

THE UNITED STATES ELECTRICAL TOOL COMPANY
3646 Llewellyn Street, Cincinnati 23, Ohio

Correction

On page 59 of the August GRINDING and FINISHING there was an announcement to the effect that the Form-All Mfg. Co., Long Valley, N.J. had appointed American Coldset Corp., Teterboro, N.J. as national distributor. The companies involved have informed us that this arrangement is not in effect. Dealers interested in handling the Form-All line of dressers should contact Mr. Clement J. Henion, Sales Mgr., Form-All Mfg. Co., Long Valley, N. J.

Chipman President of AIME Metallurgical Society in '59

The Metallurgical Society of the American Institute of Mining, Metallurgical and Petroleum Engineers, has announced the election of **Dr. John Chipman**, Professor of Metallurgy, Massachusetts Institute of Technology, to become President of the Society for one year beginning at the annual AIME business meeting next February, and the election of **Dr. Carleton C. Long** as Vice President. He will succeed Dr. Chipman as President in 1960. Dr. Long is Director of Research, Zinc Smelting Division, St. Joseph Lead Company, Monaca, Pa.

Dr. Chipman will succeed **Dr. Walter R. Hibbard, Jr.**, of Schenectady, N.Y., Manager, Alloy Studies Research, General Electric Co., as President of The Metallurgical Society. Dr. Hibbard continues in that post until the AIME Annual Meeting in San Francisco in February.

New directors of The Metallurgical Society, taking office in February, will be: **Ralph W. Farley,** Republic Steel Corp., Chicago, three years; **Dr. John H. Hollomon**, Manager, Metallurgy and Ceramic Research, General Electric Co., Schenectady, N. Y., three years; **Albert E. Lee, Jr.**, American Metal Climax, Inc., one year; **Oscar T. Marzke,** Vice-President-Research, U. S. Steel Corp., Pittsburgh, one year; **John D. Sullivan**, Technical Director, Battelle Memorial Institute, Columbus, Ohio, three years, and **Michael Tenenbaum,** Superintendent, Metallurgy Dept., Inland Steel Co., East Chicago, Ind., one year.

Abrasive Cutting Processes To Be Featured At Metal Show, Oct. 27-31

Two cost-reducing, abrasive-cutting units, each featuring Campbell's oscillating head assembly, will be featured at this year's National Metal Exposition & Congress, to be held at the Cleveland Auditorium from October 27-31.

The Model 1-A Sever-All, a small big-capacity, high-speed dry abrasive cutting machine, and the Model 481 Oscillating Wet Abrasive Cutting machine making fine quality cuts, are the two abrasive-cutting units.

Displayed also will be the complete line of Allison abrasive wheels, rubber-bonded and resinoid-bonded types.

Elgin Abrasives Names Kessler & Associates As Sales Representative

The Abrasives Division of the Elgin National Watch Co. announces the J. K. Kessler & Associates will act as sales representative for its industrial products line in the state of Florida. The firm will handle sales of diamond compounds, diamond grinding wheels, carbide rotary tools, diamond powders, diamond saws, and Elgiloy spring materials.

The organization will have offices at 3313 W. Sevilla Circle, Tampa 9, and 19441 N.E. 1st Court, Miami.

Bausch & Lomb Feature Optical Gage Equipment at Metal Show, Oct. 27-31

Bausch & Lomb Optical Co., Rochester, N.Y., feature the DR-25 Optical Gage, Balphot and Research Metallographs at the National Metal Exposition, Cleveland Public Auditorium, Oct. 27-31.

Ultra-precision measurements of depth, thickness, height and diameter are said to be obtained on the new DR-25, with measuring range continuous from 0" to 3".

The Balphot and Research Metallographs are designed for quick, accurate determination of crystalline structure, composition and non-metallic inclusion content of metals. The research model is especially equipped for critical work.

Baker Bros. Buys Screwmatic 750 Line

Baker Brothers, Inc., Toledo manufacturer of metalworking machinery, has bought the Detroit Screwmatic 750 line from Gear Grinding Machine Co., Detroit. The name of the machine will be changed to Baker Automatic Bar Machine.

A single-spindle automatic bar machine with ¾" diameter capacity, the Screwmatic 750 has been produced in two models, each capable of performing multiple operations on precision metal parts produced from bar stock.

Among the personnel transferring to Baker Brothers are John Brophy, Robert Rack, and Charles Cagnon. Brophy will continue in charge of Sales.

Ex-Cell-O Acquires German Plant

Ex-Cello Corporation, Detroit, has obtained all the outstanding capital shares of Werkzeugmaschinenfabrik Goeppingen G. m. b. H., Goeppingen, Wuerttemberg, producer of a line of lathes, medium size planers and textile looms. The plant will operate as an independent subsidiary.

An 11-acre site has been purchased in the adjoining city of Eislingen for erection of a new manufacturing plant and office building. The German firm can then manufacture not only its own line of products, but also the products of Ex-Cell-O Corporation and its other subsidiaries.

Thomas Hollis, Jr., General Manager, Cutting Tool Division of Brown & Sharpe Manufacturing Co., Providence, R.I., announces the following appointments:

William P. Sheffield will assume new duties as Assistant to the General Manager. He was formerly Superintendent of the High Speed Steel Group. **Frank E. Montie** will succeed him in that capacity.

T. Russell Hall has been assigned Assistant Superintendent, High Speed Steel Group; **Patrick G. Lindemann**, Department Foreman of the machining sections, and **Dimitri Yasinczuk** is now Supervisor of Quotation Section for High Speed Steel Cutting Tools.

AUSTRALIA—The Australian Timken Proprietary Ltd. of Ballarat, Australia, a wholly owned subsidiary of The Timken Roller Bearing Co., Canton, Ohio, has now completed construction of the buildings that will house the new manufacturing operations of one million bearings a year. Elmer Schweitzer, formerly Plant Manager of the Zanesville, Ohio, plant is the Managing Director. Walter Jehu, District Manager of the Boston sales office is now Director of Sales at the new plant.

T. Hollis, Jr.

W. P. Sheffield

F. E. Montie

E. N. Shutts

Emmett N. Shutts has been elected Executive Vice-President of the Hartford Steel Ball Co., Inc., West Hartford, Conn. He succeeds the late **Stephen V. Zavoico** as operating head of the company.

Shutts joined the firm in 1950 as New England Sales Representative. In 1956 he was appointed Assistant General Sales Manager. Early this year he was elected a Vice-President.

Any and Every
DIAMOND TOOL...
you name it,
CLIPPER makes it!
Single-pointed diamond wheel dressers
Cluster-type diamond wheel dressers
Diamond-impregnated wheel dressers
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Special-shaped diamond tools for turning and boring
Diamond tools for radius dressing and radius forming
Also outstanding selection of diamond wheels and hones
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NEWS OF INDUSTRY *continued*

Gulton Division Name Change

Gulton Industries, Inc., 212 Durham Ave., Metuchen, N.J., officially announces the changing of the name of its **Glennite Instrumentation Division** to the **Gulton Instrumentation Division.** Glennite is the company's registered trade mark and includes components, instruments and equipment produced by other divisions of the company. Confusion has been caused in sales and literature inquiries in which information is requested on Glennite products that are not necessarily marketed by the now-called Gulton Instrumentation Division.

Carbo Lists Aides For Project

I. Wendell Hamm, Carborundum Co. Vice-President and Assistant General Manager of the bonded Abrasives Division, heads a "task force" formed to get the company's $10 million vitrified plant project "underway immediately and to guide it to a successful conclusion."

William F. Pearson, Manager of the company's resinoid abrasive wheel plant at Logan, Ohio, will serve as Project Manager for the 4 to 14" vitrified wheel plant. **William H. Merk,** Manager of Production Engineering, will report to Hamm as Manager for all other vitrified plant projects. **Grant G. Byrnes,** Rubber Plant Superintendent, has been appointed Manager of the Logan plant to succeed Pearson.

J. A. Cloutier

G. Masurat

James A. Cloutier has joined the Chicago sales organization of Bay State Abrasive Products Co., Westboro, Mass., assigned to the northern Indiana territory. He brings to his new responsibilities seven years of abrasive sales engineering experience.

George Masurat has been promoted to General Superintendent of Production for Philco Corporation's Government and Industrial Division. In his new position, he is responsible for production operations of the Terrier missile fuze, Transac computers, Signal Corps radio relay equipment and Sidewinder missile.

During the past two years, Masurat was Production Superintendent of the Sidewinder missile operations. He has been with Philco since 1943.

GRAVITY OR ELECTROCOATED?

ELECTRO COATED ABRASIVES LICENSEE

Your Clover representative may suggest *gravity-process* coated abrasives, if that seems best. More often, however, he will suggest *Electrocoated*, because it yields a sharper, more efficient abrasive for certain applications. Most important to him is supplying the very best product for your individual task.

Ask your Clover Distributor for samples or for a new Clover Catalog, or write us direct. Fifty-odd years of experience in abrasives is yours for the asking.

Since 1903

Clover Manufacturing Company

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Makers of the famous
CLOVER Grinding and Lapping **COMPOUNDS**

L. Marks

K. H. Grim

Disogrin Industries, Inc., Mt. Vernon, N.Y., recently announced the appointment of **Lewis Marks** as Sales Manager of the company. At the same time, **Kenneth H. Grim** was named to the new position of Manager, Application Engineering Grim will be in control of all product development from the engineering aspect, and responsible for selling Disogrin and Disogrin products at the executive level.

Sterling Grinding Wheel Co., Tiffin, Ohio, announces the appointment of **Harry A. Brickner** as an Abrasive Engineer in the Pittsburgh Tri-State area. Brickner has had ten years' previous experience in the abrasive industry.

Correction

Bay State Abrasive Co. informs us that their release on their new sales employee, A. D. Diedrich, Jr., should have stated his previous employment as being with the "Michigan Abrasive Co." It read, and was so printed in error, as "Mid-West Abrasive Co."

A. H. Johnson

W. C. Mullin

Alford H. Johnson has been appointed Sales Manager for the Cutting Tool and Gage Division of Pratt & Whitney Co., Inc., West Hartford, Conn. Prior to his new appointment, Johnson was located in Chicago as Sales Manager of the Mid-Continent sales territory. He will move to the main office in West Hartford to direct all sales activities throughout the country.

William C. Mullin will manage instrument gage sales for the entire country. He previously directed the sales of these products for the East-West territory only.

A. F. Miller, Jr., East-West Regional Sales Manager for cutting tools and conventional gages, has resigned.

The **Industrial Filtration Division** of the **U. S. Hoffman Machinery Corp.**, New York City, has been transferred to Syracuse, N.Y. All inquiries regarding filtration equipment should be sent to the Industrial Filtration Division, U. S. Hoffman Machinery Corp., Thompson Road Plant No. 1, Syracuse, N.Y.

● ACTUAL MANUFACTURERS OF RESINOID METAL AND VITRIFIED DIAMOND WHEELS UP TO AND INCLUDING 20" DIAMETERS

Call or write for literature today!

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PEKAY ABRASIVES, INC.
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get ALL universal features plus real economy . . .

STERLING "G-2"
Universal
TOOL & CUTTER GRINDER

Sterling Features include . . .

- 25° Tilting Spindle
- 360° Spindle Rotation
- Anti-Friction Table
- 180° Table Swivel
- 2 Speed Table Traverse
- 10¾" Swing Over Table
- Rugged Construction

Accuracy, Long Life and Low Upkeep are Built-In

From the heavy cast, vibration damping, base to the two speed motorized tilting spindle the STERLING "G-2" is built for easy operation and maximum accuracy. Set-up can be made faster on a wider variety of jobs because of the built-in versatility of the STERLING "G-2". Work is finished more accurately, too, because of the built-in stability.

For maximum capacity, versatility and accuracy with minimum investment, investigate the STERLING "G-2" Universal Tool & Cutter Grinder. Plain grinder also available. Ask your STERLING Dealer or write direct for details.

McDONOUGH MANUFACTURING CO.
1522 GALLOWAY
EAU CLAIRE, WISC.

Shifts In Norton Co. Field Sales Personnel

Roderick L. Smith has been appointed a field engineer at the Indianapolis district office of Norton Co., Worcester, Mass. Smith's former territory of N. Dak., Minn., and Wis., has been divided and will be handled by two newly appointed abrasive engineers, **Edward A. Rogers** and **Carl Folz, Jr.**, formerly field engineers at the Chicago district office.

Three other former field engineers, who have been appointed abrasive engineers, and their territories are: **Robert W. Bennett**, western Ia., eastern Neb., and part of S. Dak.; **John H. Hartleb**, Ore. and northern Calif.; **John H. Saunders**, southwestern Pa. and the Wheeling, W. Va. area.

Dexter and Blanchard Reappointed at P & W

Albert M. Dexter has been named Director of Metrology at Pratt & Whitney Co., Inc., West Hartford, Conn. In his newly created assignment, he will direct all activities that have to do with the science of measurement in the Gage Division. He will also be responsible for quality control and conventional gage inspection.

Chrysostom B. Blanchard is the new Superintendent of the Gage Division, replacing **Harold G. Lucas** who retired October 1.

Dexter joined the company in 1936 as an installation engineer. He rose through the ranks to become Assistant Chief Engineer in 1940, Chief Research Engineer in 1947, and Manager of Gage Research in 1954. Blanchard affiliated with the firm in 1937. In 1952, after filling various positions, he became Supervisor in charge of Gage Routing and Estimating, the title he held to his present re-appointment.

A. A. Milkie

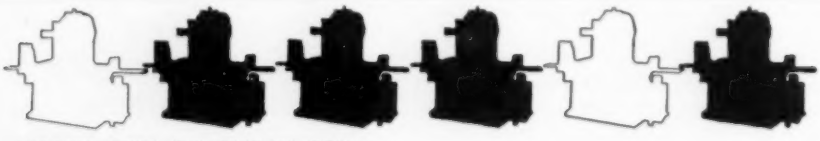
A. A. Milkie has been named Manager of the Chicago District of the Pangborn Corp., Hagerstown, Md., manufacturers of abrasives, blast cleaning and dust control equipment. He has served with the corporation as a sales engineer in the Chicago District since 1951, and will now direct the field engineering service and the staff of sales personnel.

P. E. Mitchell

Philip E. Mitchell has been appointed Industrial Sales Engineer for the De Laval Separator Co., Poughkeepsie, N.Y. He will serve Cleveland and the surrounding industrial areas. A newcomer to the firm, Mitchell has had over 16 year's experience in the centrifugal machinery field.

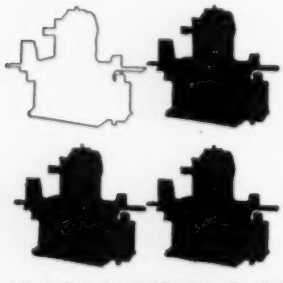
A. H. Killermann

Adam H. Killermann of Delray Beach, Fla., will join the sales organization of Bay State Abrasive Products Co., Westboro, Mass. He will be responsible for sales in the state of Florida. Killermann brings to his new responsibilities previous abrasive sales engineering experience, gained with a grinding wheel manufacturer and with a Ft. Lauderdale, Fla. distributor of industrial cutting tools.



SEVEN OUT OF EVERY TEN

GRAND RAPIDS GRINDERS...



— are purchased by firms already owning one or more of them. Three out of every 10 sold go to new customers. Once you've enjoyed the advantages of a Grand Rapids Grinder in your plant, chances are, like so many present users, you'll surely want more of them.

Write for 24-page book that tells you why.

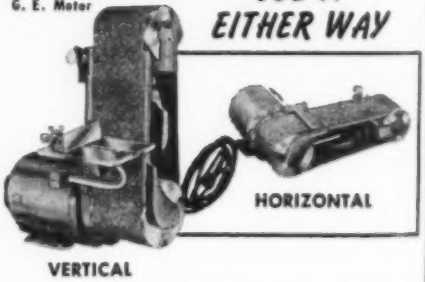
GALLMEYER & LIVINGSTON

GALLMEYER & LIVINGSTON CO.
416 Straight Ave., S.W. Grand Rapids, Michigan

WALLS TU-WAY BELT SANDER

USE IT EITHER WAY

Full 1/3 h.p. G. E. Motor



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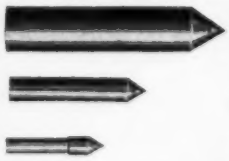

Gilmore Diamond Tools

These Needle-Point Diamonds are used on wheels for grinding taps, thread gauges, etc.

from $1.50 up

Write for Illustrated 32 page catalog.

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Grinding Outer Surface of Cone Shaped Part

Grinds and Laps in One Operation

Helped Hupp Aviation Solve Visual Finish and Deburring Problems

How and Why of Abrasive Wheels
by James Price & Joseph Biglin

How Heat Distortion Affects Large Surface Grinders
by John C. Wilson

Raw Materials Testing
by James R. Gilman

The Cleaning of Grinding & Finishing Coolants
by Arthur L. Wilson ..... .25

Developing Standard Time Data for Grinding Operations
by E. A. Cyrol $1.00

Grinding and Finishing

222 E. Willow — Wheaton, Ill.

Smoothest finisher around

MODEL RA-1
0.5 cu. ft. capacity

New, portable ROLLABRADER

Gives you all the performance of larger more costly equipment—including steel ball burnishing—PLUS light weight and bench-type operation. Has dual drive shafts with 20 to 40 rpm variable speed. Barrel easily lifts off neoprene drive-rollers. AC ¼ hp motor, ready to operate anywhere. Closed 6-sided burring barrel with orange "No-Seam" vinyl lining.

DETAILS are available in new catalog sheet, "Model RA" with complete specifications. Send for your free copy today.

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In standard and special sizes and shapes for:

OPERATIONS	MATERIALS
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Slicing, Dicing	Germanium, Silicon
Drilling	Glass, Quartz
Reaming	Marble, Granite
Generating	Ceramics, Porcelain
Pencil edging	Sapphire
Chamfering, Beveling	Boron carbide
Grooving	Cermets

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AIRETOOL pneumatic grinders handle tough jobs in a hurry!

Powerful Airetool production grinders won't stall under heavy loads ... won't heat up under steady use. Airetool pneumatic motors give plenty of driving power — constant, efficient speed.

Horizontal grinders cut costs on heavy metal removal and finishing operations. Two models, 4" to 8" abrasive wheels. Controlled speeds, 4500 to 9000 rpm. Abrasive belt attachment fine-finishes dies, molds, welds, contours.

Vertical grinders save finishing time and money on flat and curved surfaces. Even balanced design. Handle easily. Two models with 6" cup or wire wheel; 9" sanding disc capacity.

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MANUFACTURING COMPANY
SPRINGFIELD, OHIO

Nick Markovits has been named to the Sales Department of the Tool and Wheel Division of the American Coldset Corp., Teterboro, N.J., to cover the Northern New Jersey area. He has been active in the grinding field for a number of years.

DEMONSTRABLY, the WORLD'S FINEST
DIAMOND WHEEL LINE
AVAILABLE IN
RESTRICTED TERRITORIES
We are seeking expanded distribution control in all key U.S. Industrial areas.
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Grinding & Finishing, Wheaton, Ill.

Obituary

Herbert A. Stanton, 71, former President and Director of Norton Behr-Manning Overseas, Inc., and Vice-President and Director of Norton Co., died August 26.

H. A. Stanton

Stanton began his career with Norton in 1912 as credit manager. He retired in 1952. When Norton Behr-Manning Overseas, Inc., was formed in 1951, Stanton became its first President. He was formerly Managing Director at the Norton Grinding Wheel Co. in England. At the time of his retirement, he was a Director of each of Norton's foreign grinding wheel plants and President of the French and Italian plants.

The Amplex Corp., West Hartford, Conn., has announced the appointment of representatives in New York and Pennsylvania for their complete line of precision graded diamond powders and diamond compounds. Representatives and territories include: **Edward F. Allen** of Rochester, for western N. Y. and northwestern Pa., and **William M. Meehan** and **William M. Meehan, Jr.** of William M. Meehan & Sons of Syracuse, in the eastern N.Y. and northeastern Pa. areas.

E. F. Allen

W. M. Meehan

W. Meehan, Jr.

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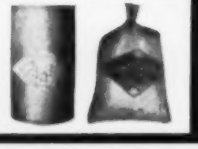
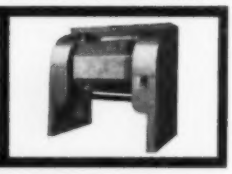
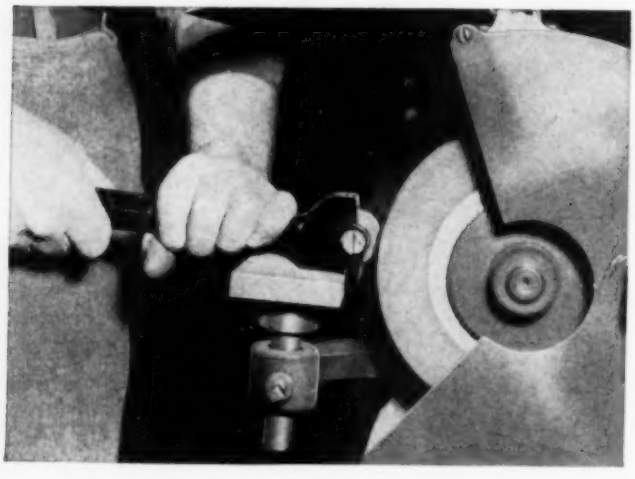


Barrel Finishing Equipment — Abrasive Media & Compounds. Write for Data Sheets and Price List. GF-10.





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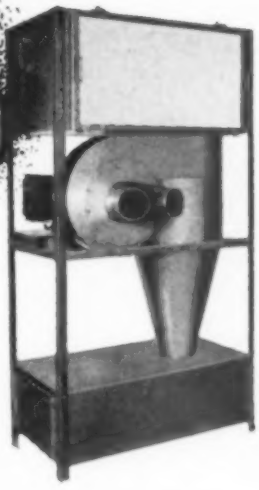

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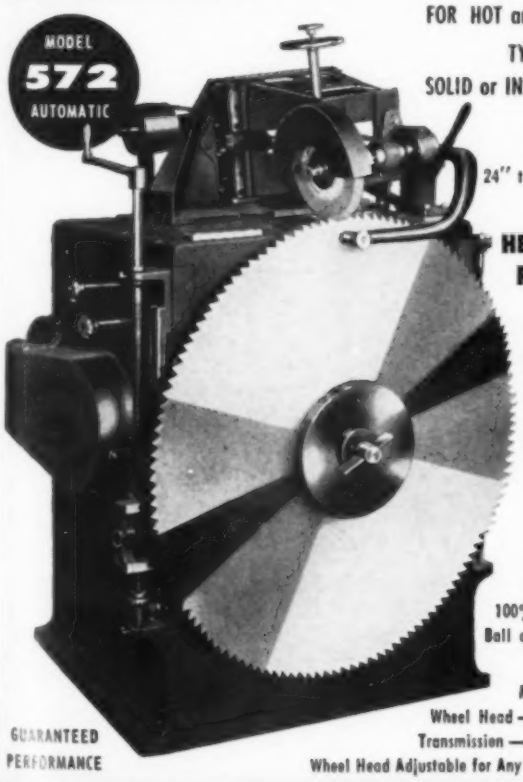

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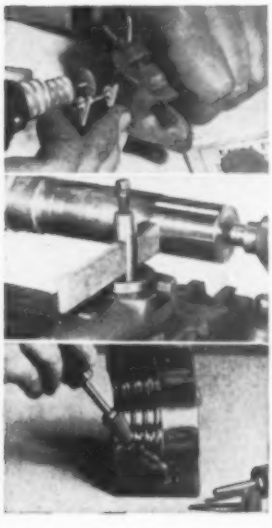

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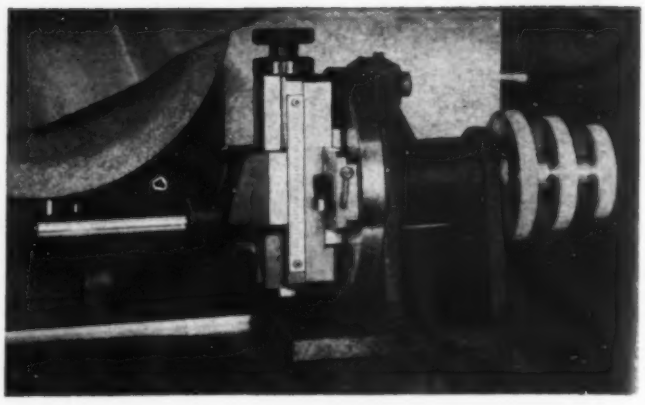

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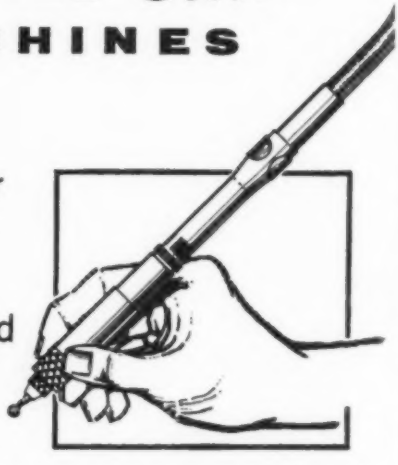

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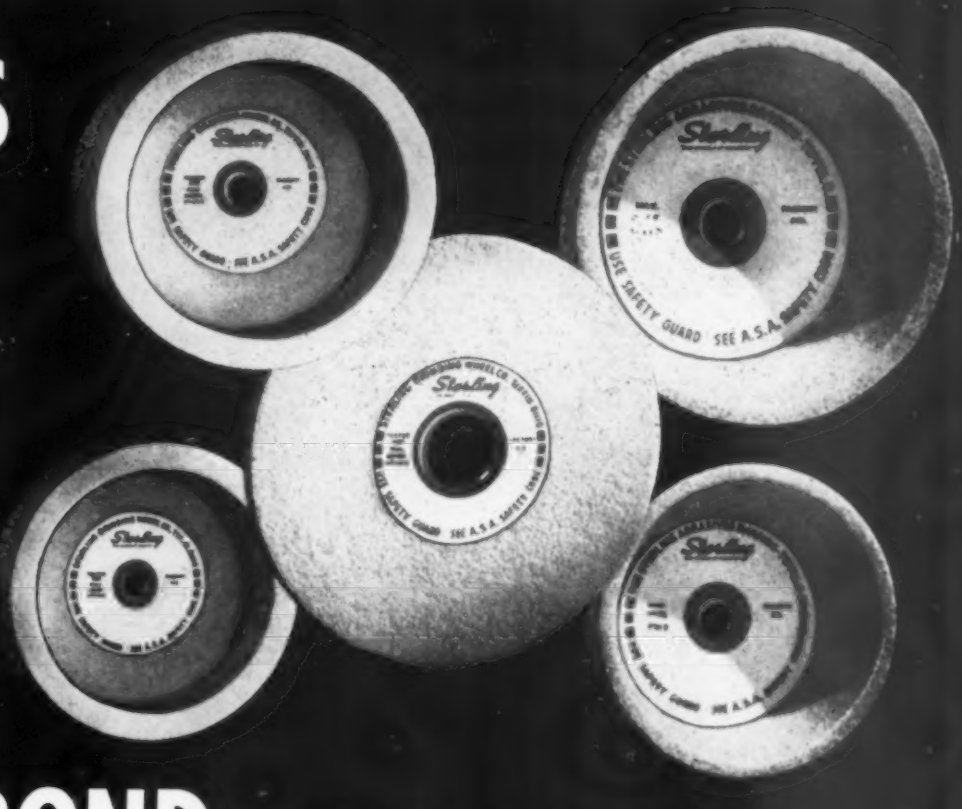

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ALUNDUM TUMBLEX "T" Abrasive. Bonded, triangular and fast-cutting for special shaped parts. They won't wedge in work slots or holes. Four sizes.

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TUMBLEX "N" Abrasive. Natural stones, exclusively Norton. For high lustre, especially on die castings and soft metal. Rounded shape brings up highest lustre. Seven sizes.

G-341

If you're still finishing metal parts the long, hard way, now's the ideal time to find the fastest, most effective barrel finishing equipment, methods and abrasives.

For example, one leading aircraft parts manufacturer reports saving over $90,000 yearly by shifting from hand-finishing to barrel finishing with Norton TUMBLEX abrasives.

There's one sure way for you, too, to get these cost-cutting, product-improving "Touch of Gold" advantages. Your metal parts can range from tiny needles to hefty forgings . . . may be simple or complicated, hard metals or soft . . . may require deburring, descaling, better color and closer finish. Just send sample parts to our Sample Processing Department. They'll be returned to you completely finished to requirements, with a detailed report. Or, next time you're in our area, drop in and learn how your finishing can be improved.

NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.

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